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SHIPSAN TRAINET

European Manual for Hygiene Standards and Communicable Diseases Surveillance on Passenger Ships

European Commission Directorate General for Health and Consumers

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European Manual for Hygiene Standards and Communicable Diseases Surveillance on Passenger Ships

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Abbreviations

ARI	Acute Respiratory Illness
CCP	Critical Control Point
CFU	Colony Forming Unit
CL	Critical Limit
CLIA	Cruise Line International Association
CXR	Chest X-Rays
EAHC	Executive Agency for Health and Consumers
EC	European Commission
ECC	European Cruise Council
ECDC	European Centre for Disease Prevention and Control
ELDSNet	European Legionnaires' Disease Surveillance Network
EPIET	European Programme for Intervention Epidemiology Training
EU	European Union
EUMS	European Union Member States
EWGLI	European Working Group on Legionella Infections
EWRS	Early Warning and Response System
FAO	Food and Agriculture Organization
FCV	Feline Calicivirus
FIFO	First in – First out
GI	Gastrointestinal Illness
HACCP	Hazard Analysis Critical Control Point
IHR	International Health Regulations 2005
ILI	Influenza-Like Illness
ILO	International Labor Organization
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
IPM	Integrated Pest Management
ISO	International Organization for Standardization
IWA	International Water Association
MARPOL	International Convention for the prevention of pollution from ships
MDH	Maritime Declaration of Health
NTU	Nephelomeric Turbidity Unit
OMP	Outbreak Management Plan
PPE	Personal Protective Equipment
PSA	Passenger Shipping Association
PVC	Polyvinyl Chloride
QUAT	Quaternary Ammonium Compound
RWF	Recreational Water Facilities
RQ	Requirement
SOLAS	Safety of Life at Sea
ST	Recommended Standard
VAT	Value Added Tax
VOC	Volatile Organic Compounds
VSP	Vessel Sanitation Program
WHO	World Health Organization
WSP	Water Safety Plan

Table of contents

i. Introduction

In 2009, approximately 390 million passengers ferry trips were recorded through European ports and 188 cruise ships were domiciled or participated in the European cruise ship market. The European cruise market has grown by 41% from 2006 to 2009 and more than doubled over the last 10 years. A considerable proportion of the European population travels in modern ships, which are becoming more complex and are designed to carry many more passengers and crew.

Ships move continuously from one country to another where different standards of sanitation are required. These differences can cause administrative difficulties for competent authorities of countries, as well as for ship companies, when trying to deal with the prevention and control of communicable diseases on board ships. Therefore, there is a need for standards regarding health related issues, which can be adopted and accepted by all European Union Member States (EUMS).

The SHIPSAN project (No A/790577) study revealed a diversity of approaches and practices in the conduct of ship inspections, differences in the competencies of inspectors and the legislation applied during inspections, and a lack of communication and training among many EUMS. Common inspection tools at a European level for hygiene inspection practices and port to port communication were recommended.

This document is Deliverable No 8 produced under work package 5 of the SHIPSAN TRAINET project. Ten working groups were established for the development of this document with participants/experts from 17 European countries. The European Centre for Disease Prevention and Control (ECDC), the World Health Organization (WHO), the International Maritime Organization (IMO) and the US Vessel Sanitation Program (VSP) also provided input. The European Cruise Council (ECC), the Cruise Lines International Association (CLIA) and individual cruise and ferry companies have also contributed to the development of this document.

The content of the manual was based on expert opinion consensus reached during working group meetings and on EU legislation and International Health Regulations 2005 (IHR) requirements. The SHIPSAN project (No A/790577) study results, literature review and analysis of collected data on policies, guidelines and practices implemented by the EUMS were also used to develop this manual.

ii. Purpose and audience of the manual

The EU SHIPSAN TRAINET project manual incorporates hygiene standards based on EU legislation and brings together best practice guidelines for passenger ships sailing within European waters.

The purpose of this manual is to collaborate with the industry and competent authorities in developing and implementing comprehensive sanitation programmes, using current legislative frameworks, in order to minimise the risk of communicable diseases. It also gives guidance on communicable disease surveillance on board ships. Compliance with the hygiene standards and best practice guidelines of the manual can help to improve and maintain: a) the hygiene level on board passenger ships sailing to or within the EU waters, b) the level of compliance with hygiene standards that are included in the existing EU legislation, and c) the safety of food, water and environmental conditions for passengers and crew.

This manual is intended for passenger shipping companies and public health inspectors in European ports, who are responsible for passenger ship inspections. Hygiene inspections of passenger ships are conducted by assessing conditions observed against the criteria contained within Chapters 1 to 10, of Part A of this manual, excluding the Annexes.

The SHIPSAN TRAINET project put into action a pilot implementation of the manual in 2010-11, before producing this final version. The following countries participated in the pilot phase: Cyprus, Estonia, Germany, Greece, Italy, Malta, Spain, the Netherlands and Turkey. During the six months pilot implementation, potential amendments were identified. These were included in the pilot implementation report and were revised in the SHIPSAN TRAINET manual.

Training based on this manual was provided to port health officers of the competent authorities, as well as ships' crews, in order to harmonise inspection practices in EUMS and to help industry with implementation of EU legal standards and best practice.

The SHIPSAN TRAINET project has developed a communication system in close collaboration with selected competent authorities in the EUMS and shipping companies. This facilitates the exchange of enhanced information through the normal channels in each of the EUMS involved in the project.

iii. Manual structure and format

This document consists of two Parts:

Part A describes the standards for hygiene inspections and communicable disease surveillance on board ships. These standards are a compilation of existing legislation, procedures and best practice. Each chapter of the manual starts with a short introduction and continues with the detailed description of requirements and recommended standards. For each requirement or recommended standard a numbered short phrase has been provided on the left side of the page. On the right side of each page the abbreviations "RQ" (requirement) or "ST" (recommended standard) are provided in order to assist the user to easily distinguish legal requirements from SHIPSAN recommended standards. Requirements are necessities that must be implemented on board in order to comply with EU legislation. Recommended standards represent good practices, which are not currently legislated but the implementation of which will help ensure a high level of hygiene. Excerpts and references to legal documents of the EU and international legislation are provided at the end of each chapter.

Part B includes guidelines for the management of communicable disease on board passenger ships. Specific guidelines are given for dealing with influenza-like illness (ILI), general considerations for influenza pandemics, Legionnaires' disease and gastroenteritis.

iv. Administrative procedures

The administrative procedures below are designed to be used by the trained competent authorised inspectors of competent authorities, who conduct the inspections against the criteria set out in the manual. They will also be of use to the passenger ship industry in order to prepare for possible inspections.

Some issues for permanent implementation of the inspection programme are described in Annex 1 in order to give a future perspective for a possible permanent implementation.

Participating authorities

Competent authorities from each country that collaborate with SHIPSAN participate in the network and carry out inspections.

Inspection team – competency and authorisation

Only officers authorised as competent by their EUMS, who have undertaken appropriate training in their own EUMS and received additional training from SHIPSAN TRAINET, will conduct the inspections. The selection criteria for the inspectors who will be involved in the inspections have been developed by the SHIPSAN TRAINET network working group in consultation with the EUMS. Professional activities, educational qualifications, ability to communicate effectively with the ship crew, previous experience, continuing professional development and scientific activities formed the basis of the criteria for selecting the inspection team members. The inspection team in each country is appointed by the EUMS, taking into consideration the selection criteria developed by the SHIPSAN TRAINET network working group.

Frequency of inspections

It has been decided that the frequency of SHIPSAN routine inspections will be specified as one inspection every six months. In the future, the frequency can be calculated by using a risk assessment procedure.

Standardisation of inspections

Inspection procedures are described in Annex 2. The use of a standardised inspection form (inspection outlines) during the inspection is considered necessary in order to ensure consistent implementation of inspection procedures, to reduce the subjectivity of the implementation of standards, and to record the inspection findings in a consistent manner. Standardised inspection forms (inspection outlines) will be used for each topic (food safety, potable water safety etc.). The inspection outlines are based on the hygiene standards included in the manual and generally based on existing European legislation. A summary table describing all record keeping included in the manual can be found in Annex 3.

The standardised inspection report will include deficiencies which are based on both legal requirements (RQ) and recommended standards (ST) as these constitute the overall SHIPSAN standards. Part B of this manual is for guidance only and will not form part of SHIPSAN inspections. Annexes provide supplementary material that can help both inspectors and the passenger shipping industry.

Scoring or grading or pass and fail system for the inspection results

The scoring system will be pilot-tested on an experimental basis. The inspection results will be graded (A, B, C, D). The grade will be based only on the standards set out in part A, Chapters 1 to 10 of this manual. When a ship obtains a D grade, it will be considered that it has failed the SHIPSAN inspection and does not comply with the standards on which the manual is based (Annex 2).

Deficiencies related to Ship Sanitation Control Certificates/Ship Sanitation Control Exemption Certificates (SSCC/SSCEC) under the IHR

If the port is authorised to issue Ship Sanitation Certificates according to IHR 2005 the results of the SHIPSAN inspection may be utilised to issue a SSCC/SSCEC, if this is requested by the shipmaster or the competent authority.

Requirements included in the SHIPSAN TRAINET manual, which represent "evidence of infection or contamination" should be recorded in the SSCC/SSCEC as set out in the IHR 2005 (World Health Organization, 2007). These deficiencies will be noted in the SSCC/SSCEC issued at the time (during a joint SHIPSAN and SSCC/SSCEC inspection) by the inspectors.

When serious non conformities are identified during an inspection the inspectors have to consider whether the ship is an "affected conveyance", as defined in the IHR. If it is decided that a ship is an affected conveyance, the inspecting authority can refuse the departure or entry of the ship, using either their national public health legislation or the requirements set out in the IHR.

When needed the competent authority may also implement additional health measures, including isolation of the ship, in order to prevent the international spread of diseases. Where such additional measures are used they should be reported to the national authority responsible for implementing the IHR (normally known as the IHR National Focal Point). If a country implements additional health measures, which 'significantly interfere'* with international traffic they must provide the WHO with the public health rationale and relevant scientific information to justify this action. WHO will then share this information, and information about the health measures implemented, with other countries and organisations.

Inspection categories

The definition of an "inspection" used in this manual is based on the Regulation (EC) No 854/2004, but has been modified since ship inspection involves not only food, but water, waste management, Legionnaires' disease prevention and other issues of public health importance.

"Inspection" means the examination by competent authorities of establishments and the processing thereof, of businesses, and their management and production systems, including documents, finished product testing, of the origin and destination of production inputs and outputs, in order to verify compliance with the legal requirements in all cases (Regulation (EC) No 854/2004). SHIPSAN

* 'Significant interference' generally means refusal of entry or departure of a ship on an international voyage, or its delay, for more than 24 hours.

inspections will also include assessment of compliance with requirements and recommended standards set out in part A, Chapters 1 to 10 of this manual. Annexes provide supplementary material that can help both inspectors and the passenger shipping industry. Guidelines are included in part B of the manual and do not form part of the SHIPSAN inspection standards.

It is intended that the following types of inspections would be included in the SHIPSAN programme: 1) routine unannounced inspections, 2) follow up inspections, 3) other types of inspections. Routine inspections will be conducted according to the specific frequency required (see paragraph "Frequency of inspections" on page 13). Follow up inspections will be conducted in the following circumstances: a) when the ship received unsatisfactory inspection result, b) in order to check specific critical deficiencies cited during the previous routine inspection. The frequency of follow up inspections will be determined by the severity of the non-conformities observed. In any case, any follow up inspections will be conducted no later than four weeks after the previous routine inspection, when this is feasible, by a competent authority that is participating in the SHIPSAN TRAINET. Other types of inspections will be conducted in case of complaints or during outbreak investigations.

Corrective action

A corrective action report (Annex 4) detailing each deficiency identified during the inspection and the corrective action taken should be submitted to the competent authorities by the passenger shipping operator. Corrective action report should be submitted 21 days after receiving the Final pilot inspection report. The corrective action report may contain requests for clarification of items noted on the inspection report.

The information included in the corrective action report sent by the ship representative will then be recorded in the SHIPSAN TRAINET database.

Corrective actions will be based upon the specific manual requirements.

Publication of inspection results

During the pilot phase, inspection results will not be published, but will be recorded in the restricted area of the SHIPSAN TRAINET database. The inspection results will only be available to view by the ship/shipping company in question and by competent authorities that have agreed to participate in the SHIPSAN TRAINET implementation.

Protection of data confidentiality

Special provisions have been made to protect the confidentiality of data, by using software and by adopting policies to protect the network and the network-accessible resources from unauthorised access. Each user will need a unique password to access the data and will have different levels of access depending on authorisation given to them. This will help to protect sensitive data from companies, authorities and other persons.

The ships/shipping companies will have full access to their own data and will be able to analyse this information.

PART A

Requirements and recommended standards for hygiene and communicable diseases surveillance

- Definitions
- Medical facilities
- Communicable diseases surveillance on board ships
- Food safety
- Potable water safety
- Recreational water safety
- Pest management
- Housekeeping and facilities
- Hazardous substances
- Waste management
- Ballast water management

Definitions

General

Bulkhead: A transverse wall within a ship for interior compartmentalisation and/or division.

Cleaning: The removal of soil, residues, dust, grease or other objectionable matter [CAC/RCP39, 1993].

Competent authority: Any authority in a EUMS that is responsible for public health and hygiene inspections or communicable diseases surveillance of passenger ships (e.g. port health authorities).

Deck: Any of the various underfoot platforms built into a vessel, equivalent to floor.

Deckhead: The underside of the deck, equivalent to ceiling.

Disinfection: The reduction, by means of chemical agents and/or physical methods, of the number of microorganisms in the environment, to a level that does not compromise safety or suitability [FAO, 2003].

Hazard: A biological, chemical, physical or radiological agent that has the potential to cause harm [WHO, 2004].

International voyage: A voyage between points of entry in the territories of more than one country, or a voyage between points of entry in the territories of the same country if the ship has contacts with the territory of any other country on its voyage but only as regards those contacts [IHR 2005].

Passenger ship/ship: Any seagoing or inland passenger ship (with more than 12 passengers) sailing within the EU waters, providing accommodation and/or food to passengers, and/or potable water from the ship water distribution system to passengers, or having a duration of voyage of more than 6 hours.

Personal Protective Equipment (PPE): All equipment designed to be worn or held by the worker to protect him against one or more hazards likely to endanger his/her safety and health at work, and any addition or accessory designed to meet this objective [Directive 89/656/EEC].

Recommended standard: Good practice not currently legislated, but their implementation is appropriate for maintenance of a good standard of hygiene.

Requirements: Necessities that must be implemented on board in order to comply with EU legislation.

Risk: A function of the probability of an adverse health effect and the severity of that effect, consequential to a hazard [Regulation (EC) No 178/2002].

Medical facilities

Hygiene Plan: A plan designed for medical facilities and equipment that includes appropriate provisions of disinfection, sterilisation, hand washing and correct use of personal protective equipment.

Surveillance

Case: Any person who has died (otherwise than as a result of accident, regardless of cause) on board or any person with a reportable illness as listed in Annex A of the case/outbreak recording form or a person with fever (≥38°C, 100°F) and symptoms as listed in Annex B of the case/outbreak recording form.

Communicable diseases: Any disease that can be transmitted from one individual directly or indirectly to another individual, or any disease that can be transmitted from an animal or a vector or a vehicle to an individual.

Epidemiological surveillance: The ongoing systematic collection, analysis, interpretation and dissemination of data concerning cases of communicable diseases/events/outbreaks for the purpose of allowing appropriate preventive and control measures to be taken.

Isolation: Separation of ill or contaminated persons or affected baggage, containers, conveyances, goods or postal parcels from others in such a manner as to prevent the spread of infection or contamination [IHR, 2005].

Quarantine: The restriction of activities and/or separation from others of suspect persons who are not ill or of suspect baggage, containers, conveyances or goods in such a manner as to prevent the possible spread of infection or contamination [IHR, 2005].

Syndrome definitions

Gastrointestinal illness (GI):

Acute diarrhoea (three or more episodes of loose stools in a 24 hour period);

or

Vomiting and at least one of the following symptoms:

- one or more episodes of loose stools in a 24 hour period
- abdominal cramps
- headache
- muscle aches
- fever ≥38°C (100°F) [US VSP].

Influenza-Like Illness (ILI): A person with sudden onset of fever of ≥38°C (100°F) and cough or sore throat in the absence of other diagnoses [WHO].

Outbreak: The occurrence of cases of disease with a frequency in excess of what would normally be expected (for the specific itinerary and time). Normal expectancy is determined from historical/baseline data for the ship. A single case of a communicable disease long absent from a population, or caused by an agent (e.g. bacterium or virus) not previously recognised in that community or area, or the emergence of a previously unknown disease, may constitute an alert for a possible outbreak and should be reported.

Outbreak definition for gastroenteritis: An increase in the number of cases of gastroenteritis above the number normally occurring in that ship over a defined period of time and itinerary.

Outbreak definition for ILI: An increase in the number of cases of ILI above the number normally occurring in that ship over a defined period of time and itinerary.

Pneumonia: Chest x-ray evidence of pneumonia.

Threshold for reporting gastroenteritis outbreak: For reporting purposes, two different thresholds should be used. An initial report should be prepared and sent to the competent authority at ports, when the percentage of reportable gastroenteritis cases reaches 2% or more among passengers or 2% or more among crew. A second report should be sent when the number of reportable gastroenteritis cases reaches 3% or more among passengers or 3% or more among crew.

Signs and symptoms (required for illnesses and deaths)

Decreased level of consciousness: Condition of an ill person when he or she is not fully aware of what is going on around himself or herself, may appear confused, or may be unusually difficult to awaken. An ill person with decreased consciousness may not know the date or their name [US CDC, 2009].

Fever: A measured temperature of 38°C (100°F) or greater.

Jaundice: Yellowish discoloration of skin, eyes and/or other bodily tissues or fluids [US CDC, 2009].

Persistent cough: A cough that is either frequent or severe enough to catch the attention of others on board the ship or a severe cough that lasts three weeks or more [US CDC, 2009].

Recent weakness or paralysis: New or recently occurring weakness or partial or complete inability to move the arms, legs, or the muscles used for swallowing or breathing [US CDC, 2009].

Severe diarrhoea: Diarrhoea accompanied by signs of dehydration [US CDC, 2009].

Severe vomiting: Vomiting accompanied by signs of dehydration* [US CDC, 2009].

Shortness of breath: Gasping for air; unable to catch his or her breath; breathing too fast and struggle to get enough air [US CDC, 2009].

Skin rash: Areas on the skin with multiple red bumps; red, flat spots; or blister-like bumps filled with fluid or pus that are intact or partly crusted over. Rashes may be discrete, may run together and may include one or more areas of the body [US CDC, 2009].

Swollen glands: Enlargements of glands located in the head, neck, or groin, notably of salivary or parotid glands or lymph nodes [US CDC, 2009].

Unusual bleeding: Noticeable and unusual bruising or bleeding from the gums, ears and nose or on areas of skin for which there is no obvious explanation [US CDC, 2009].

Food safety

Approved/nominated suppliers: A company or a person that supplies the ship with safe foodstuffs (Regulation (EC) 852/2004) which complies with European legislation standards.

Cross contamination: The contamination of a food product from another source. There are four main ways that cross contamination can occur: i) food to food, ii) equipment or work surfaces to food, iii) people to food and iv) pests to food.

Eggs: Eggs in shell – other than broken, incubated or cooked eggs – that are produced by farmed birds and are fit for direct human consumption or for the preparation of egg products [Regulation (EC) No 853/2004]. Eggs used in catering are predominantly chicken, although duck, quail and others can be used.

Equipment: An article that is used in the operation of a food business (passenger ship food operation) such as a freezer, refrigerator, oven, sink, table, temperature measuring device or dish/pot/utensils washing machine.

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* Dehydration: signs of dry mouth, skin, or lips; weakness or light-headedness particularly when standing; tenting of skin or loss of turgor so that skin may shrivel and wrinkle; production of less urine; or abnormally dark urine.

Fishery products: All sea water animals (except for live bivalve molluscs, live echinoderms, live tunicates and live marine gastropods, and all mammals, reptiles and frog) whether wild or farmed and including all edible forms, parts and products of such animals [Regulation (EC) No 853/2004].

Food contact surfaces: Surfaces intended to be in direct contact with food or onto which food may drain, drip or splash.

Food handler: Any person, temporary food handlers and contractors, who directly handles packaged or unpackaged food, food equipment and utensils or food contact surfaces and is therefore expected to comply with food hygiene requirements [FAO, 1998].

Food hygiene: The measures and conditions necessary to control hazards and to ensure fitness for human consumption of a foodstuff taking into account its intended use [Regulation (EC) No 852/2004].

Foodstuff (or food): Any substance or product, whether processed, partially processed or unprocessed, intended to be, or reasonably expected to be ingested by humans. It includes drink, chewing gum and any substance, including water, intentionally incorporated into the food during its manufacture, preparation or treatment [Regulation (EC) No 178/2002].

High risk foods: Foods that may contain and support the growth of microorganisms and are intended for consumption with or without further treatment to destroy microorganisms (e.g. cheese from pasteurised milk and cheese from unpasteurised milk, low acid foods such as mortadella, ground raw meat products such as sausages and hamburgers, raw fresh chilled or frozen meat, including poultry, products) [FAO/WHO, 2004].

Low risk foods: Foods that are unlikely to contain pathogenic microorganisms or will not support growth of pathogenic microorganisms but due to their processing may support their growth. This category includes carbonated beverages, alcoholic drinks, coffee and tea, dried herbs, grains and grain derivatives (corn flakes), honey, sugar and bakery products [FAO/WHO, 2004].

Meat: Edible parts of the animals [Regulation (EC) No 853/2004].

Minced meat: Boned meat that has been minced into fragments and contains less than 1% salt [Regulation (EC) No 853/2004].

Poultry: Farmed birds, including birds that are not considered as domestic but which are farmed as domestic animals, with the exception of ratites (flightless birds such as ostrich) [Regulation (EC) No 853/2004].

Ready to eat food: The status of the food being ready for immediate consumption at the point of service or sale. It could be raw or cooked, hot or chilled, and can be consumed without further heat-treatment including reheating.

Ship food operation (food business): Any undertaking, whether for profit or not and whether public or private, carrying out any of the activities related to any stage of production, processing and distribution of food [Regulation (EC) No 178/2002].

Ship food operator (food business operator): The natural or legal persons responsible for ensuring that the requirements of food law are met within the food business (passenger ship food operation) under their control [Regulation (EC) No 178/2002].

Traceability: The ability to trace and follow a food, feed, food-producing animal or substance intended to be, or expected to be incorporated into a food or feed, through all stages of production, processing and distribution [Regulation (EC) No 178/2002].

Utensils: Any of the instruments or vessels commonly used in a galley such as eating utensils (knives, forks etc.) and baking utensils (ladle, tongs etc.).

Potable water

Air gap: The unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying water to a tank, plumbing fixture, or other device and the flood-level rim of the receptacle or receiving fixture. The air gap would typically be at least twice the diameter of the supply pipe or faucet, or at least 2.5 cm [WHO, 2008].

Backflow preventer: An approved backflow prevention plumbing device that would typically be used on potable water distribution lines where there is a direct connection or a potential connection between the potable water distribution system and other liquids, mixtures, or substances from any source other than the potable water supply. Some devices are designed for use under continuous water pressure, whereas others are non-pressure types [WHO, 2008].

Backflow: The undesirable reversal of flow of water or mixtures of water and other liquids, gases or other substances into the distribution pipes of the potable water supply of water from any other source or sources [Foundation for cross connection control and hydraulic research 1993]. Back-siphonage is one form of backflow.

Control measures: Those steps in drinking water supply that directly affect drinking water quality and that collectively ensure that drinking water consistently meets health based targets. They are activities and processes applied to prevent hazard occurrence [WHO, 2004].

Corrective action: The action to be taken when the results of monitoring indicate a deviation from an operational limit [WHO, 2008].

Cross connection: Any unprotected actual or potential connection or structural arrangement between a public or a consumer's potable water system and any other source or system through which it is possible to introduce into any part of the potable system any used water, industrial fluid, gas, or substance other than the intended potable water with which the system is supplied. Bypass arrangements, jumper connection, removable section, swivel or change-over devices and other temporary or permanent devices which or because of which backflow can occur are considered to be cross-connections [WHO, 2008].

Deadleg/blind end: A length of pipe closed at one end through which no water passes, or pipes leading to a fitting through which water only passes when there is draw off from the fitting.

Hazardous event: An incident or situation that can lead to the presence of a hazard [WHO, 2004].

Non-potable water: Water not intended for:

- drinking, washing, bathing, or showering;
- use in the vessel's hospital;
- handling, preparing, or cooking food; and
- cleaning food storage and preparation areas, utensils, and equipment.

Operational monitoring: The procedure that assesses the performance of control measures at appropriate time intervals [WHO, 2004].

Potable water: Water meeting the requirements laid down in Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption. According to the Directive 98/83/EC, "water intended for human consumption" means:

- All water either in its original state or after treatment, intended for drinking, cooking, food preparation or other domestic purposes, regardless of its origin and whether it is supplied from a distribution network, from a tanker, or in containers

- All water used in any food production undertaking for the manufacture, processing, preservation or marketing of products or substances intended for human consumption unless the competent national authorities are satisfied that the quality of the water cannot affect the wholesomeness of the foodstuff in its finished form [Directive 98/83/EC].

Verification: The use of methods, procedures or tests in addition to those used in monitoring to determine if the Water Safety Plan is in compliance with the stated objectives outlined in the water quality targets and/or whether the Water Safety Plan need modification and revalidation [WHO, 2008].

Water Safety Plan (WSP): A comprehensive risk assessment and risk management approach that encompasses all steps in water supply from source to consumer in order to ensure the safety of potable water [WHO, 2004].

Recreational water facilities (RWF)

Alkalinity: A measure of the concentration of alkaline salts dissolved in the water. Total alkalinity is the water's resistance to pH changes [WHO, 2006].

Automatic controllers: A system of at least one chemical probe, a controller, and an auxiliary or integrated component that senses the level of one or more RWF water parameters and provides a signal to other equipment to maintain the parameter(s) within a user – established range.

Backwash: The process of reversing the flow of water through a filter to clean the filter media from matter accumulation and prevent mud ball formations that can hinder filter operation.

Bathing load: The maximum number of people that are allowed to use a RWF (e.g. swimming pool), at one time, for safety and hygiene issues.

Bromine: A halogen chemical element that works as a disinfectant in pool and spa water to kill bacteria and algae, and oxidises ammonia and nitrogen compounds that can enter the RWF from swimmer body wastes and other sources.

Chlorine: Same as for bromine. This is the disinfectant that is most commonly used for disinfection of potable and recreational waters.

Circulation rate: The flow rate of water to and from the pool through all the pipe work and the treatment system, it is related to turn over period [WHO, 2006].

Coagulation: The process employed to enhance the removal of dissolved, colloidal or suspended material by addition of a chemical coagulants prior to filtration. The dissolved solids are suspended out of solution and clump together forming flocks which are more easily trapped in the filter [WHO, 2006].

Combined halogen (bromine or chlorine): The substance formed when halogen combines with ammonia or other nitrogen containing compounds. They are still disinfectants but 40-60 times less effective than free available halogen.

Effluent: The treated stream emerging from a wastewater unit, system or process.

Filter: A device that separates particulate matter from water by circulation through a porous medium.

Filtration rate: A measurement of the volume of water that passes through a filter per unit of surface area in a given period of time expressed in litres/minute/square meter (U.S. gallons/minute/square foot).

Flow meter: A device that measures the rate of flow of a substance through a conduit.

Free halogen (bromine or chlorine): Halogen that has not combined with ammonia, nitrogen, or other organic compounds.

Halogen demand (e.g. chlorine or bromine demand): The halogen consumed by materials in the water such as bacteria, algae, dirt, leaves and swimmers waste. The halogen demand must be satisfied before a halogen residual is available to disinfect the pool water.

Halogen residual (or disinfectant residual): The amount of halogen (chlorine or bromine) remaining in RWF after satisfying the halogen demand. The halogen residual can be expressed as free halogen residual (e.g. free chlorine), combined halogen residual (combined chorine); or total halogen residual (that it is the total of free and combined halogen residual).

Hot tub/spa: A body of water designed for sitting or lying in up to the neck, and not for swimming. It is a self contained body of water that is filtered and chemically disinfected. Usually a hot tub/spa is not drained, cleaned or refilled after each user but after a number of users or a maximum period of time. Hot tub contains hot water to 30-40°C (86-104°F) and has hydrotherapy jet circulation with or without air induction bubbles. Common terms for hot tub are spa pool, hot spa and whirlpool spa. Jacuzzi is the registered trade name for a specific manufacturer and should not be mistaken for a generic name for spa pools or hot tubs. Some hydrotherapy pools - spa may have cold water.

Inlets: Fittings through which filtered water enters the pool.

Leisure water pools: Water pools for leisure activities.

mg/L: An abbreviation for milligrams per liter or parts per million (ppm), which is a concentration measurement for sanitisers and other chemical parameters such as alkalinity, chlorine, hardness etc.

Outlets: Devices through which water exits the pool to the filtration system (including main drain, skimmers and perimeter overflow system or gutters).

pH: The negative logarithm of the hydrogen ion concentration, which is a measure of the degree of acidity or alkalinity of a solution, where value 7 is neutral, higher values are more alkaline and lower values are more acidic.

Recirculation: The process of pumping water from the pool through the filter system and returning it to the pool.

Recreational Water Facilities: A water facility that has been constructed, installed, or modified for the purposes of public swimming or recreational bathing. It includes but it is not limited to swimming pools, hot tubs, leisure water pools, children's pools, etc.

Swimming pool: A watertight basin, chamber or tank containing an artificial amount of water suitable for swimming, diving and recreational bathing.

Total halogen (bromine or chlorine): The sum of all active halogen compounds or otherwise the sum of free and combined halogen.

Turbidity: A measure of the amount of suspended solids in water. It quantifies the clarity of the water expressed as nephelometric turbidity units (NTU).

Turnover period: The time taken for a volume of water equivalent to the entire pool water volume to pass through the filters and treatment plant and back to the pool. It is calculated by dividing the volume of pool by the flow rate.

Pest management

Harbourage: Any conditions or place where pests can live, nest or seek shelter.

Integrated Pest Management: A documented process/programme of controlling pests consisting of five steps. These include inspection, identification, establishment of threshold levels, employment of control measures and evaluation of effectiveness. To be acceptable, the control measures must be environmentally compatible [NPMA, 2006; WHO, 2007].

Pest: Organisms (rats, insects, etc.) which may cause illness or damage or consume or infest food products and other materials important to humans.

Pesticide: Any chemical substance used for killing pests which complies with the Directive 98/8/EC. It includes insecticides (products used for the control of arthropods) and rodenticides (products used for the control of mice, rats or other rodents) (1998a).

Reservoir: An animal, plant or substance in which an infectious agent normally lives and whose presence may constitute a public health risk [IHR, WHO 2007].

Vector: An insect or other animal which normally transports an infectious agent that constitutes a public health risk [IHR, WHO 2007].

Housekeeping

Nappy (diaper) changing area: An area appropriate for nappy changing, which is located inside the nursery and play areas.

Nursery and play area: A facility of the ship where children under 6 years old are cared for by the designated crew.

Ventilation systems: A system which provides sufficient air at an appropriate temperature [IMO, 2002].

Hazardous substances

Biocidal products: Active substances and preparations containing one or more active substances, put up in the form in which they are supplied to the user, intended to destroy, deter, render harmless, prevent the action of, or otherwise exert a controlling effect on any harmful organism by chemical or biological means. An exhaustive list of 23 product types with an indicative set of descriptions within each type is given in Annex V of the Directive 98/8/EC [Directive 98/8/EC concerning the placing of biocidal products on the market].

Chemical agent: Any chemical element or compound, on its own or admixed, as it occurs in the natural state or as produced, used or released, including release as waste, by any work activity, whether produced intentionally or not and whether placed on the market or not [Directive 98/24/EC].

Chemical mixture: A mixture or solution composed of two or more substances [Regulation (EC) No 1272/2008].

Chemical preparation: A mixture or solution composed of two or more substances [Directive 67/548/EEC].

Chemical substance: A chemical element and its compounds in the natural state or obtained by any manufacturing process, including any additive necessary to preserve its stability and any impurity deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition [Regulation (EC) No 1272/2008].

Hazardous chemical agent: (i) Any chemical agent meeting the criteria for classification as a dangerous substance (ii) any chemical agent which, whilst not meeting the criteria for classification as dangerous may,

because of its physicochemical, chemical or toxicological properties and the way it is used or is present in the workplace, present a risk to the safety and health of workers [Directive 98/24/EC].

Material Safety Data Sheet: Provides a mechanism for transmitting appropriate safety information on classified substances and preparations, including information from the relevant Chemical Safety Report(s) down the supply chain to the immediate downstream user(s) [Regulation (EC) No 1907/2006].

Packaging: One or more receptacles and any other components or materials necessary for the receptacles to perform their containment and other safety functions [Regulation (EC) No 1272/2008].

Use: Any processing, formulation, consumption, storage, keeping, treatment, filling into containers, transfer from one container to another, mixing, production of an article or any other utilisation [Regulation (EC) No 1907/2006].

Waste management

Animal by-products: The entire bodies or parts of animals or products of animal origin not intended for human consumption, including ova, embryos and semen [Regulation (EC) No 1774/2002]. This includes catering waste e.g. raw meat and fish products no longer fit for consumption.

Black water or sewage:

Drainage and other wastes from any form of toilets and urinals;

- drainage from medical premises (dispensary, sick bay, etc.) via washbasins, wash tubs and scuppers located in such premises;
- drainage from spaces containing living animals; or
- other waste waters when mixed with the drainage defined above [MARPOL, ANNEX IV].

Chemical waste: Discarded solid, liquid, and gaseous chemicals, for example from diagnostic and experimental work and from cleaning, housekeeping, and disinfecting procedures [WHO, 2007].

Emission: Any release of substance subject to control by Annex VI of MARPOL from ships into the atmosphere or sea [MARPOL].

Food waste: Any spoiled or unspoiled victual substances, such as fruit, vegetables, dairy products, poultry, meat products, food scraps, food particles and all other materials contaminated by such wastes, generated aboard ships, principally in the galley and dining areas [IMO, Guidelines for the Implementation of Annex V of MARPOL (sec. 1.7.2)].

Garbage: All kinds of food, domestic and operational waste excluding fresh fish and parts thereof, generated during the normal operation of the ship and liable to be disposed of continuously or periodically except of sewage [IMO, MARPOL, Annex V]. Hazardous and medical wastes are excluded from this definition for the purpose of this document [See below for definitions for medical and hazardous wastes].

Grey water: Drainage from dishwasher, shower, laundry, bath and washbasin drains and where such drainage does not include and is not mixed with drainage from toilets, urinals, hospitals, and animal spaces, as defined in regulation 1(3) of Annex IV, as well as drainage from cargo spaces [IMO, International Maritime Organization Guidelines for Implementation of Annex V of MARPOL (Sec. 1.7.8)].

Harmful substance: Any substance which, if introduced into the sea, is liable to create hazards to human health, harm living resources and marine life, damage amenities or interfere with other legitimate uses of the sea and includes any substance subject to control of the MARPOL convention [IMO, Guidelines for Implementation of Annex V of MARPOL (Sec. 1.6.2)].

Hazardous waste: A type of waste, which, because of its quantity, concentration or physical or chemical or biological/infectious characteristics, may pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed or otherwise managed. Hazardous waste has the following properties: explosive, oxidising, highly flammable, irritant, harmful, toxic, carcinogenic, corrosive, infectious, teratogenic, mutagenic, ecotoxic and other [Directive 91/689/EEC].

Infectious medical waste: Substances containing viable microorganisms or other toxins which are known or reliably believed to cause disease in man or other living organisms [Directive 91/689/EEC].

MARPOL: The International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocols of 1978 [Directive 2000/59/EC].

Medical waste: Any waste generated during patient diagnosis, treatment or immunisation. Medical waste is distinguished in two categories: infectious and non-infectious [WHO, 2007].

Non-infectious medical waste: Disposable medical supplies and materials that do not fall into the category of infectious medical waste [WHO, 2007].

Pharmaceutical waste: Expired, unused, spilt, and contaminated pharmaceutical products, drugs, vaccines, and sera that are no longer required and need to be disposed of appropriately. The category also includes discarded items used in the handling of pharmaceuticals, such as bottles or boxes with residues, gloves, masks, connecting tubing, and drug vials [WHO, 2007].

Port reception facilities: Any facility, which is fixed, floating or mobile and capable of receiving ship generated waste or cargo residues [Directive 2000/59/EC].

Sewage holding tank: A tank used for the collection and storage of sewage [MARPOL, ANNEX IV].

Sharps: Items that could cause cuts or puncture wounds, including needles, hypodermic needles, scalpel and other blades, knives, infusion sets, saws, broken glass, and nails [WHO, 2007].

Shipboard incineration: The incineration of wastes or other matter on board a ship, if such wastes or other matter were generated during the normal operation of that ship [MARPOL].

Shipboard incinerator: A shipboard facility designed for the primary purpose of incineration [MARPOL].

Ballast water

Ballast water: Water with its suspended matter taken on board a ship to control trim, list, draught, stability or stress of the ship [IMO, Ballast Water Management Convention, 2004].

Ballast Water Management: Mechanical, physical, chemical and biological processes, either singularly or in combination, to remove, render harmless, or avoid the uptake or discharge of harmful aquatic organisms and pathogens within ballast water and sediments [IMO, Ballast Water Management Convention, 2004].

Harmful aquatic organisms and pathogens: Aquatic organisms or pathogens which if introduced into the sea, including estuaries or into fresh water courses, may create hazards to the environment, human health, property or resources, impair biological diversity or interfere with other legitimate uses of such areas [IMO, Ballast Water Management Convention, 2004].

Sediments: Matter settled out of ballast water within a ship [IMO, Ballast Water Management Convention, 2004].

1. MEDICAL FACILITIES

The specific medical needs of a ship are dependent on variables such as ship size, duration and destination of the voyage, and the number of passengers and crew. The majority of ships are equipped with at least a basic medical infirmary for minor injuries and ailments. It is important for a ship to have a well equipped examination and treatment room and the ability to provide authoritative medical advice. Medical staff play an important role on board, not only when injuries occur, but also in infectious disease control, outbreak investigation and surveillance.

Requirements (RQ)/recommended standard (ST)

Item	Details	RQ/ST
	Medical staff, facilities construction and maintenance	
1.1 Medical staff	• Ships must have medical staff and medical facilities in accordance with the Flag State requirements.	RQ
	• Recommendations for medical facilities and medical staff on passenger ships on international voyages are given in Annex 5.	ST
1.2 Medical facilities	• Ships must have medical space in accordance with the Flag State legislation.	RQ
	• Ships should have a minimum of one examination room per ship.	ST
	• Medical facilities should be designed to facilitate private treatment of ill passengers or crew to help prevent the spread of infectious diseases.	ST
	• Medical facilities should be separated from other facilities.	ST
	• Medical rooms should be used solely for the treatment of sick persons and for the isolation of potentially infectious patients.	ST
	• Furnishing and equipment of medical rooms should have smooth, light coloured surfaces that can be cleaned and disinfected.	ST
1.3 Isolation facilities	Ships should have: • an isolation room or the capability to provide isolation of patients; • the capability to provide quarantine.	ST
1.4 Ventilation	Medical rooms should be well ventilated.	ST
1.5 Washing facilities	Medical facilities should have toilet and hand washing facilities, which should be supplied as described in section 7.2.	ST

1.6 Medical waste management	• Medical facilities must have appropriate sharps and biomedical waste capability. • Contaminated, out of date or damaged medicines should be replaced and not used.	RQ ST
1.7 Temperature measuring devices	Temperature measuring devices must be provided and maintained in proper operational condition for patients.	RQ

1.8 Medical procedures	The following procedures are considered to be the minimum required on board:
	• maintenance for all medical equipment;
	• a medical record system with:
	  ○ well organised, legible and consistent documentation of all medical care,
	  ○ a system of appropriate medical records and communication confidentiality;
	• code team (crash team) trained and updated regularly;
	• manuals for operation of medical equipment;
	• Medical Operations Manual as required by the International Safety Management Code requirements;
	• Emergency Preparedness Plan as required by the International Safety Management Code.
		RQ

1.9 Hygiene Plan and implementation	• A Hygiene Plan for medical facilities should be implemented. • The Hygiene Plan should include disinfection, sterilisation, hand washing, laundry, medical waste management and correct use of PPE.	ST ST
1.10 Gastroenteritis Outbreak Management Plan	There should be an agreed Gastroenteritis Outbreak Management Plan, which specifies the duties for all crew members and responsibilities of the outbreak management team (see Part B, Guideline II).	ST
1.11 Isolation Plan for passengers and crew	There should be a written Medical Isolation Plan for passengers and crew suspected or known to be suffering from infectious diseases, which may require isolation. The plan should take into account the normally expected number of the passengers or crew on board (see Part A, Chapter 2 and Part B, Guidelines I and II of the manual).	ST

Requirements of EU legislation and other conventions
Council Directive 92/29/EEC on the minimum safety and health requirements for improved medical treatment on board vessels
Each MS shall take the measures necessary to ensure that:

1. (a) every vessel flying its flag or registered under its plenary jurisdiction always carries on board medical supplies which meet at least, in terms of quality, the specifications of Annex II sections I and II for the category of vessel to which it belongs;
(b) the quantities of medicinal products and medical equipment to be carried depend on the nature of the voyage - in particular ports of call, destination, duration - the type or types of work to be carried out during the voyage, the nature of the cargo and the number of workers;
(c) the content of the medicines and medical equipment included in the medical supplies shall be detailed on a checklist corresponding at least to the general framework laid down in Annex IV, sections A, B and C II 1 and II 2;
3. every vessel flying its flag or registered under its plenary jurisdiction, of more than 500 gross registered tones, with a crew of 15 or more workers and engaged on a voyage of more than three days, has a sick-bay in which medical treatment can be administered under satisfactory material and hygienic conditions;
4. every vessel flying its flag or registered under its plenary jurisdiction, with a crew of 100 or more workers and engaged on an international voyage of more than three days, has a doctor responsible for the medical care of the workers on board.

ILO Maritime Labour Convention, 2006 (Regulation 4.1):
Each Member shall ensure that all seafarers on ship that fly its flag are covered by adequate measures for the protection of their health and that they have access to prompt and adequate medical care whilst working on board.

2. COMMUNICABLE DISEASES SURVEILLANCE

Surveillance of communicable diseases on board passenger ships is an essential tool for assessing the burden of communicable diseases and to allow the early detection and management of outbreaks.

Maintaining medical logs of communicable diseases and the active monitoring of such illnesses on board will assist ships in identifying outbreaks and allow them to implement control measures rapidly and consistently.

Objectives of surveillance on board ships

- To enable timely application of preventive measures through the early detection of outbreaks and other communicable disease events.
- To inform competent authorities and to assist them in case investigation, management and follow up.
- To collect baseline information on communicable diseases by season and specific itineraries, in order to determine thresholds for outbreak detection.
- To estimate the burden of communicable diseases.
- To provide data for risk assessment.

Reporting to competent authorities in ports in EUMS

If an infection or death otherwise than as a result of accident has occurred on board a ship on an international voyage, the master is required to inform the next port of call according to the IHR. In the event of an outbreak, the competent authority staff may request to see the ship's surveillance data whilst undertaking a risk assessment. If they consider that there is a risk of transmission of the infection in their country or other MS, they may alert their national surveillance centre and/or National Focal Point. It is important, therefore, that good surveillance logs are maintained by the ship. The objectives of communicable diseases surveillance on board passenger ships can be found in Annex 6.

Requirements (RQ)/recommended standards (ST)

Item	Details	RQ/ST
	Records/Log	
2.1 Responsibility	A standardised illness medical log for each voyage must be maintained daily by the designated crew member.	RQ
2.2 Log content	• The illness medical log should list: o the name of the ship, the voyage dates and the voyage	ST

identification code;
  - all cases of communicable diseases or events or syndromes (see item 2.11, 2.12);
  - all passengers and crew who dispensed medication from the designated crew member.
- The illness medical log entry for each passenger or crew member should contain the following information: ST
  - the first date of clinic visit or report of illness to crew member;
  - the person's name, age and gender;
  - their designation as a passenger or crew member;
  - the crew member position or job on the ship, if applicable;
  - their cabin number;
  - the date and time of illness onset;
  - the symptoms of their illness;
  - the use of medication;
  - the presence of underlying medical conditions or medication side effects or other comments.

2.3 GI and ILI log

The normal daily illness medical log has additional specific logs for GI and ILI. Model specific logs are included in Annex 7 for GI and in Annex 8 for ILI. For passenger ships without specific health surveillance systems in place it is recommended that these formats or similar templates are used and maintained continually. ST

Questionnaires

2.4 GI questionnaire

Questionnaires (see an example in Annex 9) detailing activities and meal locations for the 72 hours before the onset of illness should be available in the ship infirmary and be given to all gastroenteritis cases on presentation. The completed questionnaires should be maintained alongside the GI medical log. ST

Retention

2.5 Retention

- The ship's illness medical log and the completed 72 hour self-administered questionnaires should be maintained on the ship for at least 12 months. Electronic versions of these records are acceptable as long as the data are complete and can be retrieved during inspections*. ST

* National legislation in Germany requires hard copies of the medical log.

- The ships illness medical log and the 72 hour self-administered questionnaires including all completed copies should be available for review by the authorities conducting inspections and outbreak investigations. ST

2.6 Confidentiality

All personal medical information collected by the medical staff must be protected in accordance with EU legislation for personal data protection*. RQ

Notification

2.7 Notification to the next port

- Officers in command of ships, or their agents, must make known to the port, as early as possible before arrival at the port of destination, any cases of illness indicative of a disease of an infectious nature or evidence of a public health risk on board as soon as such illnesses or public health risks are made known to the officer (ships physicians or doctors must always submit information to the master for reporting). RQ
- This information must be immediately relayed to the competent authority for the port. RQ
- In urgent circumstances, such information should be communicated directly by the master/officers to the relevant port authority. ST

Maritime Declaration of Health (MDH)

2.8 Maritime Declaration of Health

- For ships on international voyages, the master of a ship, before arrival at its first port of call in the territory of a State Party, shall ascertain the state of health on board, and, except when that State Party does not require it, the master shall, on arrival, or in advance of the vessel's arrival if the vessel is so equipped and the State Party requires such advance delivery, complete and deliver to the competent authority for that port a MDH which shall be countersigned by the ship's doctor, if one is carried. ST
- The information included will be assessed by the competent

* Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data

Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications)

Directive 2006/24/EC of the European Parliament and of the Council of 15 March 2006 on the retention of data generated or processed in connection with the provision of publicly available electronic communications services or of public communications networks and amending Directive 2002/58/EC

Regulation (EC) 45/2001 of the European Parliament and of the Council of 18 December 2000 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data

authority.

- If a doctor is on board, it is recommended to provide additional information on the case of illness to support the assessment of the competent authority.

2.9 Ships without doctor

In the absence of a doctor, the master should regard the following symptoms as grounds for suspecting the existence of a disease of an infectious nature: ST

- Any individual on board (excluding those with symptoms or other indications of a pre-existing chronic medical condition) who displays the following:
  a) Fever ≥38°C (≥100°F), persisting for several days or accompanied by: (i) prostration; (ii) decreasing level of consciousness; (iii) swollen glands; (iv) jaundice; (v) persistent cough or shortness of breath; (vi) unusual bleeding; or (vii) recent weakness or paralysis.
  b) with or without fever: (i) any acute skin rash or eruption*; (ii) severe vomiting (other than sea sickness); (iii) severe diarrhoea; or (iv) recurrent convulsions.

Specific recommendation for gastroenteritis outbreak reporting

2.10 Outbreak reporting

- For gastroenteritis outbreak reporting, an initial report should be prepared and sent to the competent authority at the next port of call, when the percentage of reportable cases reaches 2% or more among passengers or 2% or more among crew. A second update report should be sent when the number of cases reaches 3% or more among passengers or 3% or more among crew. ST
- For updates the report should be sent not less than 4 hours before the next port of call. ST
- The case/outbreak recording form found in Annex 10 may be used for reporting of any gastroenteritis outbreak. ST

Tools to help with communicable diseases surveillance

Case/outbreak recording

2.11 Case/

- The case/outbreak recording form found in Annex 10 should be used for record keeping of any case/outbreak, unless the ship ST

* Excluding allergic reactions

outbreak recording form

uses other forms or has other system in place to record the same information.

- This information should be kept on board for 12 months and be available for inspection. ST
- The case/outbreak recording form may be used for the purposes of reporting to competent authorities. ST

2.12 Case definitions

For recording or reporting purposes the use of EC case definitions is recommended ST

HTTP://EC.EUROPA.EU/HEALTH/PH_THREATS/COM/DOCS/1589_2008_EN.PDF.

Routine record keeping for GI and ILI

2.13 GI or ILI recording form

- The recording form found in Annex 11 should be used for recording of any GI or ILI, unless the ship implements other system to record and monitor GI or ILI cases, or unless the cruise/voyage lasts for less than 24 hours. ST
- This form should be completed by the designated crew of the ship at the end of the day, unless the ship implements other system to record and monitor GI or ILI cases, or unless the cruise/voyage lasts for less than 24 hours. ST

2.14 GI or ILI

For GI and ILI routine surveillance data should be collected on a daily basis for each voyage and be available for inspections. ST

Requirements of the EU and International legislation

Commission Decision 2000/57/EC (Article 1, paragraphs 1 and 2) and Commission Decision of 28 April 2008 amending Decision 2000/57/EC as regards events to be reported within the early warning and response system for the prevention and control of communicable diseases:

1. The early warning and response system of the Community network must be reserved for those events defined in Annex I*, hereinafter referred to as 'events', or indications for such events which, by themselves or in association with other similar events, are or have the potential to become public health threats.

2. The structures and/or authorities of each Member State must collect and exchange all necessary information on these events, e.g. by using the national surveillance system, the epidemiological surveillance component of the Community network or any other Community collection system.

Annex I*

Events to be reported within the early warning and response system

a. Outbreaks of communicable diseases extending to more than one Member State of the Community.

b. Spatial or temporal clustering of cases of disease of a similar type, if pathogenic agents are a possible cause and there is a risk of propagation between Member States within the Community.

c. Spatial or temporal clustering of cases of disease of a similar type outside the Community, if pathogenic agents are a possible cause and there is a risk of propagation to the Community.

d. The appearance or resurgence of a communicable disease or an infectious agent which may require timely, coordinated Community action to contain it.

Commission Decision 2000/96/EC (amended by Commission Decisions 2003/542/EC, 2007/875/EC, 2009/312/EC, 2009/539/EC):

Annex I

Diseases

- Diseases preventable by vaccination
- Sexually-transmitted diseases
- Viral hepatitis
- Food- and water-borne diseases and diseases of environmental origin
- Other diseases (diseases transmitted by non-conventional agents, air-bore diseases, zoonoses and serious imported diseases)
- Special health issues (nosocomial infections and antimicrobial resistance)

Decision No 2119/98/EC (Articles 4, 5 and 6, amended by Commission Decisions 2008/426/EC and 2008/351/EC):

1. Each structure and/or authority referred to in the second paragraph or in the third paragraph, whichever is appropriate of Article 1 must communicate to the Community network:

(a) information regarding the appearance or resurgence of cases of communicable diseases as referred to in Article 3(a) in the Member State to which the structure and/or authority belongs, together with information on control measures applied;

(b) any relevant information concerning the progression of epidemic situations for which it has responsibility for information collection;

(c) information on unusual epidemic phenomena or new communicable diseases of unknown origin;

(d) any relevant information in its possession:

- on cases of communicable diseases covered by the categories set out in the Annex,
- on new communicable diseases of unknown origin in non-member countries;

(e) information concerning existing and proposed mechanisms and procedures for the prevention and control of communicable diseases, in particular in emergency situations;

(f) any relevant considerations which could help Member States to coordinate their efforts for the prevention and control of communicable diseases, including any counter-measures implemented.

2. The Commission shall make available the information referred to in Article 3 to all the structures and authorities referred to in Article 1. Each structure/authority shall ensure that the information which they communicate to the network, pursuant to Article 4, is promptly forwarded to all other participating structures/authorities and the Commission.

3. Member States shall, on the basis of the information available through the Community network, consult each other in liaison with the Commission with a view to coordinating their efforts for the prevention and control of communicable diseases.

Where a Member State intends to adopt measures for the control of communicable diseases, it shall, before adopting those measures, inform the other Member States and the Commission on the nature and scope of those measures, through the Community network. The Member State in question shall also consult other Member States and the Commission through the Community network on the nature and scope of intended measures unless the need to protect public health is so urgent that consultation proves impossible.

Where a Member State has to adopt, as a matter of urgency, control measures in response to the appearance or resurgence of communicable diseases, it shall, as soon as possible, inform through the Community network the other Member States and the Commission.

In duly justified specific cases, appropriate prevention and protection measures, adopted by mutual agreement among Member States in conjunction with the Commission, may be taken by the Member States which so desire.

Member States shall, on the basis of their consultations and the information provided, coordinate among themselves in liaison with the Commission with regard to the measures which they have adopted, or intend to adopt at national level.

Procedures concerning the information and consultation referred to in paragraphs 1, 2 and 3 and procedures concerning the coordination referred to in paragraphs 1 and 4 must be established in accordance with the procedure laid down in Article 7.

Under the International Health Regulations (2005), which entered into force on 15 June 2007, the competent authorities of the Member States must notify or consult the World Health Organization on certain public health events, in particular those which may constitute a public health emergency of international concern, as well as on any health measure implemented in response to those events.

Those notifications and consultations concerning communicable diseases pursuant to Annex of Decision

No 2119/98/EC should be transmitted through the early warning and response system set up by Decision 2000/57/EC at the same time as to the World Health Organization, in order to ensure that the Commission and the other Member States are informed without delay.

International Health Regulation 2005

Article 37:

The master of a ship, before arrival at its first port of call in the territory of a State Party, must ascertain the state of health on board and, except when that State Party does not require it, the master must, on arrival, or in advance of the ship's arrival if the ship is so equipped and the State Party requires such advance delivery, complete and deliver to the competent authority for that port a Maritime Declaration of Health which must be countersigned by the ship's surgeon, if one is carried.

The information included will be assessed by the competent authority.

Article 28:

Officers in command of ships, or their agents, shall make known to the port or airport control as early as possible before arrival at the port of destination any cases of illness indicative of a disease of an infectious nature or evidence of a public health risk on board as soon as such illnesses or public health risks are made known to the officer. This information must be immediately relayed to the competent authority for the port. In urgent circumstances, such information should be communicated directly by the officers to the relevant port authority.

3. FOOD SAFETY

There are a number of factors which influence the standards of food safety and the likelihood of foodborne illness on passenger ships. On passenger ships a large number of people commonly eat from the same food supply. The sources of food supplied to ships may vary depending on the previous ports of call of the ship, although many ships routinely store provisions from controlled sources in designated ports.

Food handlers on ships come from a variety of countries and their experience and understanding of safe food handling procedures, together with the levels of hygiene training and expertise on the ship can vary considerably. Extensive menus with many dishes are often offered to passengers, many of whom eat on board for the majority of their voyage. As on land the preparation of a wide variety of foods at the same time for a large number of people can increase the risks of mishandling or cross contamination. Most ship companies seek to reduce such risks by good design – in particular the installation of adequately sized, fully equipped food rooms and the separation of 'low risk' and 'high risk' food processes. Other factors that influence the standards of food safety may include: a) the effective implementation and maintenance of food safety management systems including HACCP, b) the standard of food facilities and equipment including durability and ease of cleaning, c) the age of food production facilities and d) the effective repair, maintenance and condition of food handling facilities and equipment.

3.1 Hazard Analysis and Critical Control Point

HACCP is a documented, structured and systematic food safety management system. It consists of the analysis of potential food hazards within a process, the identification of points in the food production process where action should be taken to prevent these hazards, and the recording, monitoring and, where necessary, the modification of the food process and the procedures for HACCP principles implementation.

Passenger ships need to use a HACCP based approach to ensure food safety during all stages of food production, from supply and storage through to preparation, cooking and final service.

Requirements (RQ)/recommended standards (ST)

Item	Details	RQ/ST
	HACCP Principles	
3.1.1 HACCP implementation	Passenger shipping operators must be able to show that they are applying the HACCP principles in relation to food production, storage and service as follows:	RQ
3.1.2 Identification	**a. Identifying any hazards (Annex 12) that must be prevented,**	RQ

of hazards

eliminated or reduced to acceptable levels;

3.1.3 Identification of CCPs

b. Identifying the critical control points (CCPs) at the step(s) or steps at which control is essential to prevent or eliminate a hazard or to reduce it to acceptable levels; RQ

- A CCP is a point, step or procedure at which controls can be applied and a food safety hazard can be prevented, eliminated or reduced to acceptable levels. ST
- A control point may be critical if the lack of any control measure at that stage is likely to cause a health risk when the food is eventually consumed. ST
- It is vital that the CCPs are correctly identified as control needs to be exercised at these points to ensure food safety. ST
- A simple way to do this is to construct a flow chart for the various processes within the ship's food operations. ST

3.1.4 Establishment of CLs

c. Establishing critical limits (CLs) at CCPs which separate acceptability from unacceptability for the prevention, elimination or reduction of identified hazards; RQ

- A CL is the minimum or maximum value to which a physical, chemical or microbiological hazard should be controlled at a CCP to prevent, eliminate or reduce to an acceptable level a food safety hazard. ST
- CLs separate acceptability from unacceptability. ST
- When CLs are set they should be realistically achievable, practical and recordable and should effectively reduce or minimise the hazard concerned. ST

3.1.5 Monitoring procedures

d. Establishing and implementing effective monitoring procedures at CCPs; RQ

- A HACCP system should ensure that all control measures at CCPs are effectively monitored. ST
- Different hazards will require different control measures and different CLs. This means that monitoring methods may vary within a ship food operation. ST

3.1.6 Corrective actions

e. Establishing corrective actions when monitoring indicates that a CCP is not under control; RQ

- Corrective actions should be taken when monitoring indicates a deviation from an established CL. ST
- Corrective actions are intended to ensure that no product injurious to health or otherwise adulterated as a result of such a deviation ST

is used or served.

- Corrective actions have two important functions: ST
  - first, to ensure that immediate steps are taken to prevent unsafe food being served to customers by, for example, rendering the food safe by further cooking or by throwing the contaminated food away;
  - second, to prevent a re-occurrence of the same problem by identifying the cause of the failure of the control measure and taking appropriate actions to effectively counteract the problem.

3.1.7 Establishment of procedures

f. Establishing procedures, which must be carried out regularly, to verify that the measures outlined in subparagraphs (a) to (e) are working effectively; RQ

3.1.8 Validation

- Validation is concerned with obtaining evidence that the procedures for HACCP principles implementation will be effective. ST
- Validation should ensure that the information supporting the procedures for HACCP principles implementation is correct. ST

3.1.9 Verification

- Verification is a management task that involves checking that HACCP is working effectively and controlling the hazards identified within a ship's food operations. ST
- Verification actions should be recorded and documented to provide evidence that the HACCP system is working effectively. ST
- Verification procedures may include such activities as review of the procedures for the HACCP principles implementation, CCP records, CLs etc. ST

3.1.10 Record keeping

g. Establishing documents and records commensurate with the nature and size of the ship food operation to demonstrate the effective application of the measures outlined in subparagraphs (a) to (f). RQ

- Documentation and record keeping should be appropriate to the nature and size of the operation, the hazards identified and the procedures required for their control. ST
- Documentation and record keeping should be sufficient to help verify that the necessary HACCP controls are in place and being maintained. ST
- Efficient and accurate record keeping is essential in the application of procedures for HACCP principles implementation. ST
- HACCP records should be kept up to date. ST

- Records should be kept as simple and easy to understand and use as possible. ST
- Records should be kept for at least 12 months and be available for inspection. ST

3.1.11 Modification

When any modification is made to the product, process, or any step, ship food operators must review the procedure and make the necessary changes and updates to it. RQ

3.1.12 Review

- A review of the procedures for HACCP principles implementation should be undertaken when there is a change that may affect food safety to ensure that the system continues to be valid for the passenger ship food operator for example when: ST
  - a new food or menu item is produced or used, or a new catering method of food production process is applied;
  - a failure or deficiency is observed in the system;
  - a food safety incident occurs.

Requirements of EU legislation
Regulation (EC) No 852/2004 (Article 5) on the hygiene of foodstuffs:
Food business operators shall put in place, implement and maintain a permanent procedure or procedures based on the HACCP principles.

3.2 Food handlers

Food handlers can avoid creating food safety risks (such as causing contamination of food) provided they are well trained and know how to handle raw foodstuffs (which requires cooking or other process) and ready to eat food. It is a legal requirement (Regulation (EC) No 852/2004) that crew involved in a ship food operation are trained and/or supervised as appropriate for their work activity. Responsibility for ensuring that food handlers are supervised, instructed and/or trained lies with the ship food operator. Supervision, instruction, and training aim to ensure that food handlers work hygienically.

Food handlers who prepare or handle food while ill with infectious diseases transmissible through food can contaminate food and transmit illness to consumers. Excluding food handlers with infectious diseases from work is necessary to help ensure that food does not facilitate the spread of infection on a ship.

Food may be contaminated when it comes into contact with dirty surfaces or when appropriate hygiene practices are not properly applied. Hygiene practices aim to protect food from the risk of biological, chemical or physical contamination and prevent any organisms growing to an extent that would expose passengers and crew to risk or result in premature decomposition of food.

Training of food handlers

Item	Details	RQ/ST
	Training plan and record keeping	
3.2.1 Training plan	There should be a training plan which identifies: • the number and the type of food handlers employed; • the training required by each food handler.	ST
3.2.2 Record keeping	Up to date, completed records of each food handler's training should be maintained and be available for inspection.	ST
3.2.3 Food handler training	• Food handlers should be trained to an appropriate level as determined by the types of food they handle. Examples of appropriate levels and suggested training content and a model training plan are contained in Annex 13.	ST
	• If a food handler has several different duties within a ship food operation, he/she should be trained to the highest training level for the food types involved.	ST
	Exemption	
3.2.4 Non-food handlers	Non-food handlers who enter the food preparation areas, such as engineers, pest control crew, outside contractors and any other crew who work in these areas should receive appropriate supervision, instruction and/or training commensurate with their activities.	ST

Requirements of EU legislation
Regulation (EC) No 852/2004 (Chapter XII) on the hygiene of foodstuffs:
Food business operators are to ensure that:
1. food handlers are supervised and instructed and/or trained in food hygiene matters commensurate with their work activity
2. those responsible for the development and maintenance of the procedure referred to Article 5(1)* of Regulation (EC) No 852/2004 or for the operation of relevant guides have received adequate training in the application of the HACCP principles
*Article 5(1): Food business operators shall put in place, implement and maintain a permanent procedure or procedures based on the HACCP principles.

Food handlers' diseases: reporting and restriction

Item	Details	RQ/ST
	Health of food handlers	
3.2.5 Diseases	Food handlers who are infected by pathogenic microorganisms* transmissible through food must be excluded from food handling activities.	RQ
3.2.6 Medical permission	• Supervisors should ask the medical staff or other designated crew for written permission for food handlers to return to their duties after recovery.	ST
	• A record of the written permissions to return to work should be maintained for 12 months and be available for inspection.	ST
3.2.7 Reporting symptoms	Food handlers must report any symptoms of infectious disease transmissible through food to their supervisor. These usually include: • vomiting; • fever (≥38°C, 100°F); • abdominal cramps; • diarrhoea; • sore throat with fever; • any discharges from their nose; • persistent coughing and sneezing; • visible sores on their hands, arm or face; • jaundice.	RQ
3.2.8 Covering of wounds	Crew working in food handling areas should cover wounds which have the potential to contaminate food (on hands or other exposed parts of the body) with waterproof dressings.	ST

Requirements of EU legislation
Regulation (EC) No 852/2004 (Chapter VIII(2)) on the hygiene of foodstuffs:
No person suffering from, or being a carrier of a disease likely to be transmitted through food or afflicted, for example, with infected wounds, skin infections, sores or diarrhoea, is to be permitted to handle food or enter any food-handling area in any capacity if there is any likelihood of direct or indirect contamination. Any person so affected and employed in a food business and who is likely to come into contact with food is to report immediately the illness or symptoms, and if possible their causes, to the food business operator.

* such as *E. coli*, *Salmonella* Typhi, *S.* Paratyphi, *Giardia lamblia*, other parasites, hepatitis A, norovirus etc

Hygiene practices and personal hygiene of food handlers

Item	Details	RQ/ST
	Food handlers' hygiene	
3.2.9 Hygiene practices	Food handlers must prevent food contamination by working hygienically.	RQ
3.2.10 Personal cleanliness	Crew working in a food handling area must maintain a high degree of personal cleanliness.	RQ
	Clothing	
3.2.11 Protective clothing	• Crew working in a food handling area should wear suitable, clean, light coloured clothing.	ST
	• Protective clothing or uniforms should be changed as soon as they get dirty.	ST
	• Outdoor clothes and personal effects should not be brought into food preparation, handling or storage areas.	ST
	• Protective clothing or uniform should be washed at a minimum of 60°C (140°F) or below 60°C (140°F) using a suitable disinfectant and then air dried at 76°C (169°F) or above.	ST
	• Protective clothing or uniform should be suitable for the work being carried out.	ST
	• Protective clothing or uniform should completely cover other clothing.	ST
	Jewellery	
3.2.12 Jewellery wearing	• Food handlers should not wear jewellery, pendants, watches, pins or other decorative items except for a flat plain ring.	ST
	• Food handlers wearing glasses should have them secured with a band or string.	ST
	Hair	
3.2.13 Hair restraining and covering	• Crew working in food handling areas should cover their head to prevent any hair or sweat from falling into food.	ST
	• Long hair should be restrained within a hair covering.	ST
3.2.14 Facial hair covering	Facial hair such as beards should be covered with a snood.	ST

Nails

3.2.15 Nail hygiene

Finger nails should be kept short and clean. ST

3.2.16 Artificial nails and nail varnish

Artificial nails and nail varnishes should not be used. ST

Gloves

3.2.17 Glove wearing

- The use of disposable gloves should not replace effective hand washing. ST
- Disposable gloves should be used properly. Food handlers using disposable gloves should follow the guidelines given below. ST

If food handlers wear gloves, the following recommended standards should be followed:

- Wash and dry hands thoroughly before putting on gloves.
- Change gloves frequently.
- Change gloves after handling raw foods (which requires cooking or other process) and before handling cooked or ready to eat foods.
- Discard gloves that are torn, dirty or contaminated (gloves should not be left on the top of work surfaces).
- If stopping preparing food to carry out another non food handling task, such as answering the telephone or taking money from a customer, always take off gloves and put on a new pair before handling food again.
- Discard gloves when they are taken off for any reason.
- The re-use or sharing of disposable gloves should be forbidden.

Hand washing

3.2.18 Triggers for hand washing

- Food handlers should wash their hands as frequently as necessary during the day and always: ST
  - before starting work;
  - before touching any raw meat or high risk foods;
  - during food preparation as often as may be necessary to keep hands clean;
  - after break periods;
  - after using the toilet;
  - after touching any raw meat or high risk foods, using cleaning chemicals and materials, discarding waste/rubbish, having dealt with dirty dishes, utensils or other equipment, or coming in contact with any dirty item;
  - after eating or drinking, smoking or using tobacco, coughing or sneezing, touching their hair, face, nose, mouth, wounds or sores, or changing any wound dressings/plasters;
  - when changing from working with raw food which needs to be

cooked and any ready to eat food.
See Annex 14 for hand washing technique.

- Alcohol antiseptics (hand sanitisers) should not be used instead of hand washing in food preparation areas. They may be used after washing and the product should be appropriate for use by food handlers. ST
- It is recommended that the wash hand basin taps are turned on and off using the arm, elbow or foot to minimise hand contact*. ST

Other contamination sources

3.2.19 Other contamination sources

Food handlers should not: ST

- cough, sneeze or spit over or around food;
- pick, scratch or blow their nose;
- taste food with their fingers or an unwashed utensil;
- blow into glasses to polish them or bags to open them;
- smoke or use tobacco (pipes, cigars etc.) in food preparation and handling areas, including chef's office if the office is incorporated in the galley area;
- drink or eat (food, gum etc.);
- lick their fingers when handling food or wrapping materials.

Requirements of EU legislation
Regulation (EC) No 852/2004 (Chapter VIII(1)) on the hygiene of foodstuffs:
Every person working in a food-handling area is to maintain a high degree of personal cleanliness and is to wear suitable, clean and, where necessary, protective clothing.

3.3 General requirements for food preparation areas

Food preparation areas must be kept clean and maintained in good repair. The layout, design, construction and size of food preparation areas must permit adequate cleaning and/or disinfection; protect against the accumulation of dirt and contaminants; permit good hygienic practices including protection against cross contamination; and provide suitable temperature conditions for hygienic food handling.

Item	Details	RQ/ST
	Decks	
3.3.1 Materials	• The materials used for deck construction in all food rooms must be impervious, durable, non-absorbent, washable and non-toxic.	RQ
	• Suitable materials may include:	ST

* Where this is not practicable food handlers should turn off taps using disposable tissue or hand drying towels.

- stainless steel;
- ceramic, quarry tiles;
- epoxy resin;
- terrazzo.

3.3.2 Defects

Decks should be free from cracks, crevices or pitting. ST

3.3.3 Easy to clean surfaces

- Decks must be easy to clean. RQ
- In galleys or other high risk food areas, it is recommended that decks are coved at bulkheads to facilitate cleaning. ST

3.3.4 Repairing

Decks must be kept in good condition. RQ

3.3.5 Construction

The construction of decks should prevent the accumulation of dirt and debris and allow for adequate surface drainage. ST

Bulkhead surfaces

3.3.6 Materials

- Bulkhead surfaces and fixtures such as bulkhead electrical sockets must be made of materials that prevent accumulation of dirt and undesirable substances such as mould. RQ
- The materials used for bulkhead surfaces should be impervious, non-absorbent, cleanable and non-toxic. ST
- Suitable materials may include: ST
  - stainless steel;
  - ceramic tiles;
  - washable painted steel;
  - PVC;
  - epoxy resin and similar coatings.
- Bulkhead surfaces must be smooth. RQ

3.3.7 Defects

Bulkhead surfaces should be free of obstructions, fixtures, holes and other obstacles or recesses in which dirt can accumulate. ST

3.3.8 Cleanable surfaces

Bulkhead surfaces should be cleanable to a height at which they may be soiled with food particles during normal use. ST

Deckheads

3.3.9 Materials

- Deckheads and overhead fixtures (e.g. lights) must be made of materials that prevent the accumulation of dirt and undesirable substances such as mould. RQ
- Suitable materials may include among others stainless steel and ST

smooth washable painted steel.

- In order to prevent the accumulation of dirt direct fixed deckheads or suspended deckheads should be installed. ST
- Deckhead surfaces should be smooth and cleanable. ST
- Any painted deckhead surfaces should be in good condition. ST

Cleaning and disinfection

3.3.10 Cleaning and disinfection

All decks, deckheads and bulkheads must be maintained in a clean condition and disinfected periodically to remove any mould build up and any other particles or debris that could fall into food. RQ

Windows and other openings

3.3.11 Materials

Windows or port holes must be constructed to allow effective cleaning and to prevent the accumulation of dirt. RQ

3.3.12 Prevention of contamination

Windows should be protected to prevent contamination of foodstuffs and to exclude pests. Windows should be closed, protected with a screen of hole size of no more than 0.16 cm or protected by other means. ST

Doors

3.3.13 Cleaning and disinfection

- Doors must be made of materials that can be easily cleaned. RQ
- Doors that require disinfection must be made of material that can be easily disinfected. RQ

3.3.14 Materials

Suitable materials may include: ST

- gloss painted wood;
- laminated glass;
- stainless steel;
- plastic;
- rubber.

3.3.15 Construction

Doors should be flush fitting to avoid angles and mouldings that accumulate dirt. ST

3.3.16 Fingerplates and handles

Door fittings likely to come in contact with hands such as fingerplates and handles should also be capable of being disinfected. ST

3.3.17 Self closing door

Doors should preferably be automatic or self closing. ST

Equipment and food contact surfaces

3.3.18 Sound condition

Surfaces (including surfaces of equipment) in contact with food must be maintained in a sound condition and be easy to clean and, where necessary, disinfect. RQ

3.3.19 Materials

- The materials used for surfaces must be smooth, impervious, non-absorbent, washable and non-toxic and food grade. RQ
- Suitable materials may include: ST
  - stainless steel;
  - marble;
  - ceramics;
  - food grade plastics.
- Food surfaces constructed of materials not meeting these standards should be coated (e.g. painted) using materials that meet these standards. ST

3.3.20 Cleaning

Windows and other openings, doors and other surfaces (including surfaces of equipment) in areas where foods are handled must be kept clean. RQ

Requirements of EU legislation
Regulation (EC) No 852/2004 (Chapter II) on the hygiene of foodstuffs:

1. In rooms where food is prepared, treated or processed (including rooms contained in means of transport) the design and layout are to permit good food hygiene practices, including protection against contamination between and during operations. In particular:

(a) floor surfaces are to be maintained in a sound condition and be easy to clean and, where necessary, to disinfect. This will require the use of impervious, non-absorbent, washable and non-toxic materials unless food business operators can satisfy the competent authority that other materials used are appropriate. Where appropriate, floors are to allow adequate surface drainage;

(b) wall surfaces are to be maintained in a sound condition and be easy to clean and, where necessary, to disinfect. This will require the use of impervious, non-absorbent, washable and non-toxic materials and require a smooth surface up to a height appropriate for the operations unless food business operators can satisfy the competent authority that other materials used are appropriate;

(c) ceilings (or, where there are no ceilings, the interior surface of the roof) and overhead fixtures are to be constructed and finished so as to prevent the accumulation of dirt and to reduce condensation, the growth of undesirable mould and the shedding of particles;

(d) windows and other openings are to be constructed to prevent the accumulation of dirt. Those which can be opened to the outside environment are, where necessary, to be fitted with insect-proof screens which can be easily removed for cleaning. Where open windows would result in contamination, windows are to remain closed and fixed during production;

(e) doors are to be easy to clean and, where necessary, to disinfect. This will require the use of smooth and non-absorbent surfaces unless food business operators can satisfy the competent authority that other materials used are appropriate.

(f) surfaces (including surfaces of equipment) in areas where foods are handled and in particular those in contact with food are to be maintained in a sound condition and be easy to clean and, where necessary, to disinfect. This will require the use of smooth, washable, corrosion-resistant and non-toxic materials, unless food business operators can satisfy the competent authority that other materials used are appropriate.

2. Adequate provision is to be made, where necessary, for washing food. Every sink or other such facility provided for the washing of food is to have an adequate supply of hot and/or cold potable water consistent with the requirements of Chapter VII[1*] and be kept clean and, where necessary, disinfected.

[1*] Chapter VII of Regulation (EC) No 852/2004 refers to water supply.

1.	Ice which comes into contact with food or which may contaminate food is to be made from potable water or, when used to chill whole fishery products, clean water. It is to be made, handled and stored under conditions that protect it from contamination.
2.	Steam used directly in contact with food is not to contain any substance that presents a hazard to health or is likely to contaminate the food.

3.4 Source/storage/preparation/service of foodstuffs

Source/purchasing

Food safety starts with the source of food products. It is important for a ship food operation to select appropriate suppliers. Ship food operators must have systems in place to check delivered foods and must not accept on board, or must remove, any contaminated, defective or spoiled foodstuffs.

Item	Details	RQ/ST
	Source	
3.4.1 Safe food	Ship food operators must ensure that food meets safety requirements.	RQ
3.4.2 Food sourse	Ship food operators should obtain food from approved and nominated suppliers.	ST
3.4.3 Contamination during transport	All foodstuffs must be protected from contamination during transport and transfer to ship*.	RQ
3.4.4 Supplier's list	Passenger shipping companies should inspect the suppliers' establishments or otherwise assess the safety of the operation before they are added to any approved supplier list†.	ST
3.4.5 Details of list	• An approved list of direct suppliers should be used and should include either the name of the company or person, their address and documentation to prove the suppliers establishments' permit/registration or other food safety approval.	ST
	• The ship food operators and food suppliers should have a specification detailing written agreement regarding the safe standards of foodstuffs supplied to the ship.	ST

* This is the direct responsibility of the food supplier but the transportation and safe condition of food should be checked on arrival at the ship.

† These assessments may be made checking compliance with supplier third party accreditation and approval by an internationally recognised body or standard – for example ISO 22000 regarding food safety.

- The approved list of direct suppliers can be maintained either on board or ashore. The ship should contact the shore side office to get answers if needed during inspection or other situation. ST

Purchasing

3.4.6 Purchasing of food materials

Effective controls should be in place to ensure that approved suppliers are used during purchasing. ST

3.4.7 Checking of foodstuffs

- A representative part of each delivery should be checked on arrival at the ship. ST
- Any defective items, such as dented cans*, expired foodstuffs, improperly packaged foodstuff or food unfit for human consumption must be rejected. RQ
- High risk foods must be checked and those which do not meet the required standards (including temperature) rejected. RQ

3.4.8 Checking of temperatures

High risk chilled foods should be maintained at a temperature of ≤5°C (41°F) during transport†. ST

3.4.9 Record keeping

Records of all deliveries, with delivery details (date and time of delivery, officer in charge) and item details, should be kept on board for 12 months electronically or in hard copies for traceability. ST

Requirements of EU legislation
Regulation (EC) No 852/2004 (Chapter IX(1) and (3)) on the hygiene of foodstuffs:
1. Food business operator is not to accept raw materials or ingredients, other than live animals, or any other material used in processing products, if they are known to be, or might reasonably be expected to be, contaminated with parasites, pathogenic microorganisms or toxic, decomposed or foreign substances to such an extent that, even after the food business operator had hygienically applied normal sorting and/or preparatory or processing procedures, the final product would be unfit for human consumption.
2. At all stages of production, processing and distribution, food is to be protected against any contamination likely to render the food unfit for human consumption, injurious to health or contaminated in such a way that it would be unreasonable to expect it to be consumed in that state.

Storage

The shelf life of stored food depends upon the nature of the food itself, its packaging, temperature and humidity. Foods, such as dairy products, meats and eggs will spoil rapidly if not protected from contamination and stored at proper temperatures. Food that is temperature abused will spoil rapidly and this can be identified by changes in odour, flavour, colour, and/or texture. Dry food staples

* In this section 'dented' means in such a damaged condition that they may cause a food safety risk.

† SHIPSAN recommends high risk food storage temperatures at ≤5°C (41°F) as best practice however some EU countries require that chilled food is transported in a temperature of <8°C (46°F).

such as flour, seasonings and canned goods should be stored in their original packages or decanted into closed containers.

Item	Details	RQ/ST
	Storage	
3.4.10 Protection against contamination	• Food must be stored so that it is protected against contamination, deterioration and infestation.	RQ
	• Different types of foodstuffs (raw and cooked/ready to eat) should be stored separately to avoid any risk of cross contamination.	ST
3.4.11 Storage capacity	Food stores should be sufficient in number and capacity to maintain adequate, safe food storage conditions.	ST
3.4.12 Good storage practices	• Food and stored ingredients must be located away from sources of contamination (e.g. from odours or pollution).	RQ
	• Exposed foodstuffs should be covered, or otherwise protected, to prevent contamination.	ST
3.4.13 Labelling	• All foodstuffs and ingredients should be labelled with the type/name of the product and item details (e.g. expiry date) to allow traceability.	ST
	• All foodstuffs should give the ability for traceability.	ST
	Dry storage	
3.4.14 Dry stores standards	• Dry stores should be cool, dry and clean.	ST
	• Foodstuffs should be kept elevated off the decks.	ST
	• Dry food packages should be handled with care to prevent damage to the packing.	ST
	• Foodstuffs from cans and jars that are damaged, swollen or leaking should not be used.	ST
	• When foodstuff packaging has been damaged after delivery then loose dry foodstuffs (flour, rice etc.) should be decanted and stored in sealed labelled containers.	ST
	• Humidity should be controlled (for example through sufficient airflow or air changes) because moisture can affect the safety of food products.	ST
	• Cans and jars may be placed in dry stores but once opened some products (mustard, mayonnaise etc.) require refrigeration where stated by the manufacturers.	ST

3.4.15 Dates of durability

- Food that is intended to be served when a ship is in European waters must be labelled with the date of durability or in the case of foodstuffs which, from the microbiological point of view, are highly perishable, the "use by" date. The date of minimum durability of a foodstuff is the date up to which that foodstuff will retain its specific properties when properly stored. The date must be preceded by the words: ST
  - "best before…" when the date includes an indication of the day;
  - "best before end…" in other cases.
- For food items which are not labelled with durability dates, the ship food operators should have a means of establishing a safe date of use via explicit documentation that proves the safe date of use for the specific product (lot numbers etc). ST

3.4.16 First in – first out

Stored food should be rotated and used on a First In First Out (FIFO) system taking into account the durability date and shelf life. ST

Cold storage

3.4.17 Cold storage practices

- Cold storage should be used to store high risk foodstuffs which require temperature control to ensure their safety. This includes foods which may perish more readily at high temperatures (e.g. meat, fish or dairy products). ST
- Temperatures should be regularly checked in cold stores. ST
- It is recommended that this is done at least daily using internal thermometers or external reading thermometers. ST
- Cold stores should be checked regularly and products that are spoiled or expired should be removed. ST

3.4.18 Prevention of cross contamination

- Foodstuffs with different risk profiles (e.g. raw and cooked) should be stored separately to avoid any risk of cross contamination. ST
- When it is not possible to separate food with different risk profiles and these are placed in the same refrigerator or upright freezer, they should be arranged as following: ST
  - Raw meats, raw fish and shellfish, raw poultry and eggs should be stored at the bottom.
  - Unprocessed vegetables and fruits should be stored in the middle.
  - Ready to eat food should be stored on the top shelf.
- Stored partially-used ingredients should be clearly labelled and stored so that food can be protected against moisture and contamination. ST

3.4.19 Storage of high risk foods

Ship food operators should ensure that high risk food storage is at a temperature of ≤5°C (41°F)*. ST

3.4.20 Storage of frozen foodstuffs of animal origin

All frozen foodstuffs of animal origin must be stored at a temperature not more than -18°C (-0.4°F), except where a higher or lower temperature is recommended for specific products by the manufacturer. RQ

Storage of unfit foodstuffs

3.4.21 Unfit foodstuffs

- Foodstuffs that are considered not suitable or unfit for human consumption must be marked and kept separately from other foodstuffs until discarded. RQ
- Any food discovered on board which is suspected of being contaminated, defective or spoiled must be quarantined from sound foodstuffs and removed from the ship as soon as practicable. RQ

Requirements of EU legislation
Regulation (EC) No 852/2004 (Chapter IX(2), (3) and (5)) on the hygiene of foodstuffs:
1. Raw materials and all ingredients stored in a food business are to be kept in appropriate conditions designed to prevent harmful deterioration and protect them from contamination.
2. At all stages of production, processing and distribution, food is to be protected against any contamination likely to render the food unfit for human consumption, injurious to health or contaminated in such a way that it would be unreasonable to expect it to be consumed in that state.
3. Food businesses manufacturing, handling and wrapping processed foodstuffs are to have suitable rooms, large enough for the separate storage of raw materials from processed material and sufficient separate refrigerated storage.
Directive 2000/13/EC relating to the labeling, presentation and advertising of foodstuffs:
- **Article 3:**

The following particular alone shall be compulsory on the labeling of foodstuffs:
the date of minimum durability or, in the case of foodstuffs which, from the microbiological point of view, are highly perishable, the "use by" date.
- **Article 9:**

1. The date of minimum durability of a foodstuff retains its specific properties when properly stored.
2. The date shall be preceded by the words:
   - "best before……" when the date includes an indication of the day- "best before end……" in other cases
- **Article 10:**

In the case of foodstuffs which, from the microbiological point of view, re highly perishable and are therefore likely after a short period to constitute an immediate danger to human health, the date of minimum durability shall be replaced by the 'use by' date.
Regulation (EC) No 853/2004 laying down specific hygiene rules for food of animal origin:
- **Article 3**

Food business operators shall comply with the relevant provisions of Annex III*.
*Annex III: Storage and transport for foodstuffs of animal origin
- **Chapter III, paragraph D**

This Regulation lays down specific requirements on the hygiene of foodstuffs of animal origin for food business operators, it applies to unprocessed and processed products of animal origin and refers to temperature control of foodstuffs of animal origin during storage and transportation.

* SHIPSAN recommends a high risk food storage temperature of ≤5°C (41°F) or below as best practice however some EU countries require that chilled food is maintained at a temperature of <8°C (46°F).

Handling

During food handling cross contamination and physical contamination of products can occur. Cross contamination is a key factor in foodborne illness, and it usually originates from four common sources: food itself, people, food contact equipment and work surfaces and pests.

Good hygiene practices in food service are of crucial importance. For example, one key safety issue in food service is the use of utensils (e.g. tongs and spoons) because their inappropriate use could lead to the contamination of food. Waiting crew and any chefs, involved in food service are usually responsible for keeping food safe and preventing cross contamination.

Item	Details	RQ/ST
	Handling	
3.4.22 Cross contamination during handling	• Raw food which requires cooking or any other processing before consumption and ready to eat/cooked foods should be kept separate from each other during handling and preparation to avoid cross contamination.	ST
	• The same utensils and equipment (knives, plates, spoons, cutting boards, meat slicers etc.) should not be used to handle raw food which requires cooking or other process and ready to eat foods without cleaning and disinfection between uses.	ST
	• Separate work surfaces, equipment and utensils should ideally be provided to prevent the risk of cross contamination between different types of food.	ST
	• The same chopping boards must not be used for different types of foodstuffs unless cleaned and disinfected between uses.	RQ
	• Chopping boards and cook knives must be cleaned and disinfected before changing from raw food which requires cooking or other process and ready to eat foods (and vice versa) and at least one time every four hours if used for continuous handling of a single product.	RQ
3.4.23 Fruits and vegetables	Fruits and vegetables which will not be peeled should be rinsed with potable water or solutions designed for washing foodstuffs before food preparation to remove soil, bacteria, insects and chemicals.	ST
	Service	
3.4.24 Cross contamination during service	• Crew involved in serving food should use clean utensils (e.g. a spoon or ladle) to serve food.	ST
	• The food contact part of serving utensils (tongs, ladles, spoons etc.) used for food service should not be in direct contact with	ST

hands.

- A clean dish should always be used for serving cooked and prepared foods. ST
- Cooked food should never be placed back into the same container it was stored in before cooking or during preparation. ST
- Crew who serve food should wear clean clothing or an apron. ST
- Sneeze guards (front and side guards) or suitable protection should be installed to prevent contamination of food on display or in service. ST

Requirements of EU legislation
Regulation (EC) No 852/2004 (Chapter IX (3) and (6)) on the hygiene of foodstuffs:
1. At all stages of production, processing and distribution, food is to be protected against any contamination likely to render the food unfit for human consumption, injurious to health or contaminated in such a way that it would be unreasonable to expect it to be consumed in that state.
2. Where foodstuffs are to be held or served at chilled temperatures they are to be cooled as quickly as possible following the heat-processing stage, or final preparation stage if no heat process is applied, to a temperature which does not result in a risk to health.

Temperature and time control

To ensure that food remains safe, food handlers are required to make sure that food is kept either cold or hot at an appropriate temperature. It is unsafe for many foods to be kept for a long time at ambient temperature because this can allow the growth of pathogenic bacteria, which may multiply to unsafe numbers, release toxins or allow spores to germinate.

Frozen food should be thawed in a way that prevents it remaining at ambient temperature for a sustained period. If food is thawed too far ahead of when it is actually needed then the core temperature may remain at ambient temperature for long periods.

Item	Details	RQ/ST
	Temperature control	
3.4.25 Temperature control	Raw materials, ingredients, intermediate products and finished products likely to support the reproduction of pathogenic microorganisms or the formation of toxins must not be kept at temperatures that might result in a risk to health. The cold chain must not be interrupted. However, limited periods outside temperature control are permitted, to accommodate the practicalities of handling during preparation, transport, storage, display and service of food, provided that it does not result in a risk to health.	RQ
3.4.26 Devices and process	All refrigerators, freezers, cold stores, bain maries etc. should be capable of maintaining stored foods at the relevant temperatures.	ST

Cooking

3.4.27 Cooking temperatures

- The length and temperature of cooking should be sufficient to ensure the destruction of non-spore forming pathogenic microorganisms. ST
- For the safe preparation of whole cuts or joints of meat such as beef and pork the centre of them should reach a minimum of 63°C (145°F) or above for 3 minutes, or to equivalent temperature-time combination as described below or a scientific assessment of equivalent safe food cooking temperatures should be made. ST

Temperature		Time in Minutes	Temperature		Time in Minutes
°C	°F		°C	°F	
54	130	121	60	140	12
56	132	77	61	142	8
57	134	47	62	144	5
58	136	32	63	145	3
59	138	19			

[1] *Holding time may include post oven heat rise*

- For poultry, minced or chopped meat (for example burgers and sausages) the centre of the meat should reach a temperature of at least 70°C (158°F) for 2 minutes or an equivalent time/temperature combination as given below or a scientific assessment of equivalent safe food cooking temperatures should be made. ST

Temperature		Time
°C	°F	
60	140	45 minutes
65	149	10 minutes
70	158	2 minutes
75	167	30 seconds
80	176	6 seconds

- Heat should be distributed throughout soups/gravies/stews/custard and other liquid based foods by stirring. ST

3.4.28 Sushi

- Fishery products to be consumed raw or almost raw must be frozen at a temperature of not more than -20°C (-4°F) in all parts of the product for not less than 24 hours in order to destroy parasites. RQ
- A document from the manufacturer, stating the type of process they have undergone, should accompany these fishery products. ST

Cooling

3.4.29 Cooling guidelines

- Food should be cooled as quickly as possible. ST
- The temperature at the centre of the food product should be ST

reduced from 63°C (145°F) to 21°C (70°F) in less than two hours; and from 21°C (70°F) to 5°C (41°F) or less within 4 hours.

3.4.30 Cooling methods

The following methods may be used to cool foods rapidly: ST

- placing the food in shallow pans;
- separating the food into smaller or thinner portions;
- using rapid cooling equipment, such as 'blast chillers';
- stirring the food in a container placed in an ice bath;
- placing the food in containers that facilitate the rapid transfer of heat;
- adding ice as an ingredient to the food;
- cooling food containers or food under running cold potable water;
- storing the food in a cool designated area;
- placing the food in pre-frozen or cold containers;
- using a combination of the methods described above.

Frozen food

3.4.31 Temperature of frozen foods

- Frozen foods must be maintained at -18°C (-0.4°F) or lower, except where a higher or lower temperature is recommended for specific products by the manufacturer. RQ
- Ice cream may be stored at a higher temperature only when it is about to be served. ST

Thawing

3.4.32 Thawing hazards

- High risk foods must be thawed quickly or using a method that will prevent them being kept for long periods at ambient temperature. RQ
- Frozen foods should not be thawed at ambient temperatures. ST

3.4.33 Good thawing practices

- Thawing should be carried out by one of the following methods:
  - under refrigeration at a temperature of ≤5°C (41°F)*;
  - by completely submerging food in cold running potable water at a temperature not above 21°C (70°F) for a period not exceeding 4 hours;
  - as part of cooking process (but only when thawing is taken into consideration in determining cooking time and following any directions on the food packaging);
  - by using a microwave (attention is to be given to ensure a proper thawing cycle – controlled time or temperature).

* SHIPSAN recommends a thawing temperature of 5°C (41°F) or below as best practice however some EU countries require that frozen foods are thawed in a temperature of <8°C (46°F)

- When using water to thaw food, cold running potable water should be used in a clean unstopped (i.e. no plug inserted) sink. ST
- Thawing should be carried out in a container that is larger than the food which is to be thawed. ST
- The run off liquid must be held and disposed of appropriately to avoid any risk of cross contamination. RQ
- Thawed food should not be refrozen except where it is used as an ingredient in a food that is cooked and then frozen. ST
- Food should be covered completely unless it is an item which can be thawed in its original packaging or is otherwise protected. ST
- If food is thawed in a refrigerator which is also used for food storage then it should be placed on the lowest shelves of the unit and below any stored items. ST
- While defrosting food it should not be kept in contact with other types of food. ST
- All frozen foods should be thawed prior to cooking except foods that have manufacturer's instructions which state otherwise. ST

3.4.34 Labelling

- Labels with the date or time that thawing started should be placed on food, when the thawing method requires controlled time or temperature. ST

3.4.35 Record keeping

- When the thawing method requires controlled time or temperature, records of food thawing including core temperatures and thawing times should be maintained for 12 months and be available for inspection. ST

Reheating

3.4.36 Reheating temperatures

- Reheating food should be carried out rapidly. The reheating process should be adequate to ensure food reaches a safe core temperature. ST
- The reheating process of high risk food should be adequate to ensure that the centre of the food reaches a temperature of at least 75°C (167°F) for 15 seconds or 82°C (180°F) for 1 second. ST

3.4.37 Reheating restrictions

Food should never be reheated more than once. ST

Hot holding

3.4.38 Hot holding temperature

High risk food which is to be held hot should be kept at a temperature of at least 63°C (145°F) or above until required (except where time is used as a control as set out in item 3.4.41). ST

3.4.39 Temperature check

Checks should take place on a regular basis to ensure that high risk foods are held at or above 63°C (145°F). ST

Cold holding

3.4.40 Cold holding temperatures

If high risk food is to be held cold, it should be kept at temperatures that are given in item 3.4.19 (storage temperatures), or time should be used as a control set out in item 3.4.41. ST

Time as a control

3.4.41 Time as a control for served food

When time is used as a control for served high risk food, then: ST

- Hot food should be displayed for a maximum of 4 hours, from the time that the food is removed from hot holding temperatures to the time of consumption.
- Cold food should be displayed for a maximum of 4 hours from the time that the food is removed from cold storage to the time of consumption.
- Food not consumed within 4 hours should be disposed of.

Requirements of EU legislation
Regulation (EC) No 852/2004 on the hygiene of foodstuffs:
Chapter IX(5): Raw materials, ingredients, intermediate products and finished products likely to support the reproduction of pathogenic microorganisms or the formation of toxins are not to be kept at temperatures that might results in a risk to health. The cold chain is not to be interrupted. However, limited periods outside temperature control are permitted, to accommodate the practicalities of handling during preparation, transport, storage, display and service of food, provided that it does not result in a risk to health. Food businesses manufacturing, handling and wrapping processed foodstuffs are to have suitable rooms, large enough for the separate storage of raw materials from processed material and sufficient separate refrigerated storage.
Chapter IX(7): The thawing of foodstuffs is to be undertaken in such a way as to minimise the risk of growth of pathogenic microorganisms or the formation of toxins in the foods. During thawing, foods are to be subjected to temperatures that would not result in a risk to health. Where run-off liquid from the thawing process may present a risk to health it is to be adequately drained. Following thawing, food is to be handled in such a manner as to minimise the risk of growth of pathogenic microorganisms or the formation of toxins.
Regulation (EC) No 853/2004 (Chapter III, paragraph D) laying down specific hygiene rules for food of animal origin:
This Regulation lays down specific requirements on the hygiene of foodstuffs of animal origin for food business operators, it applies to unprocessed and processed products of animal origin and refers to temperature control of foodstuffs of animal origin during storage and transportation.

3.5 Equipment and utensils

Materials used in the design and the construction of equipment and utensils should not affect the safety or quality of food. Equipment and utensils should be designed and constructed with materials that are durable and easy to clean. The materials used should retain their properties when used under normal conditions.

Item	Details	RQ/ST
	Characteristics of materials	
3.5.1 Properties of materials	• Materials used in the construction of equipment and utensils must be: ○ food safe; ○ non-toxic; ○ suitable for food contact; ○ easily cleanable; ○ corrosion-resistant; ○ smooth; ○ non-absorbent; ○ resistant to chipping, scratching, scoring and decomposition; ○ resistant to the damaging effects of detergents and disinfectants.	RQ
	Examples of appropriate materials for equipment and utensils ▪ Stainless steel ▪ Food grade plastics and laminates ▪ Copper and copper alloys (used only where rendered corrosion-resistant or where exposure to food is clearly and specifically limited to non-acidic (pH>6) food and beverage) ▪ Ceramic and enameled ware ▪ Glass	
	Migration	
3.5.2 Migration of materials to foods	Food contact materials must be made of substances that may not reasonably migrate or affect the characteristics of food. They must not be made of hazardous materials or impart a colour, taste or odour to food.	RQ
	Utensils	
3.5.3 Characteristics of utensils	• Rims, bases, handles and any other ledges or crevices of pots and pans should be easily cleanable.	ST
	• Containers and similar receptacles for unpackaged moist foods should be: ○ readily removable; ○ easily cleanable and be capable of being drained.	ST

Design and construction

3.5.4 Design of equipment

- Equipment and utensils should be designed and constructed to facilitate cleaning. ST
- Equipment should be designed and constructed to prevent accumulation of dirt and debris. ST
- Equipment, control systems and services connected to the equipment should be designed so as to allow easy access for maintenance and cleaning. ST

3.5.5 Maintenance

There should be a suitable maintenance programme or system in place for equipment. ST

3.5.6 Good condition

All articles, fittings and equipment with which food comes into contact must be so constructed, be of such materials and be kept in such good order, repair and condition as to minimise any risk of contamination. RQ

3.5.7 Placing of equipment

There should be sufficient height between the equipment and the deck to allow adequate access for inspection, cleaning and maintenance of the equipment and to allow deck cleaning. ST

3.5.8 Drainage

- Drainage facilities should be designed and constructed to avoid the risk of contamination of foodstuffs. ST
- Base plates used to support and fix equipment should have smooth, continuous and sloping surfaces to aid drainage. ST

3.5.9 Temperature control

- Equipment such as refrigerators, freezers, ovens, bain maries and dishwashers should have working temperature measuring devices installed to help ensure that appropriate temperatures are achieved and allow effective monitoring. ST
- Temperature measuring devices or thermometers on equipment should be periodically checked with a calibrated manual thermometer. This should be recorded and maintained on board for 12 months. ST

3.5.10 Calibration

Food temperature measuring devices should be accurate and where necessary calibrated in accordance with the manufacturer's instructions. ST

3.5.11 Location of temperature measuring devices

- Hot and cold food holding equipment should be equipped with at least one temperature measuring device that is positioned to allow easy observation of the device's temperature display, where ST

temperature control is needed.

- In a mechanical refrigerated or hot storage unit, the sensor of the thermometer should be located to measure the air temperature in the warmest part of a mechanically refrigerated unit and in the coolest part of a hot storage unit. ST

3.5.12 Capacity of equipment

- Equipment for food should be sufficient in number and capacity to maintain safe food storage, processing and service. ST
- Equipment used for food storage/holding should have a data plate that specifies the maximum capacity of the unit. ST

3.5.13 Transport equipment

The exposed surfaces and food contact space of food transport equipment should be easy to clean, disinfect and be kept in good repair. ST

Dish/pot/glass washing machines

3.5.14 Characteristics of washing machine

Exposed surfaces of dish, glass and pot washing equipment should be corrosion-resistant, smooth and easily cleanable. ST

3.5.15 Coating

Coatings used on temperature measuring devices should be resistant to cracking. ST

3.5.16 Temperature thermostat

Wash tanks and pumped rinse tanks designed to heat water should be equipped with a temperature thermostat for maintaining the proper water temperature in the tank. ST

Freezers and refrigerators

3.5.17 Types of freezers and refrigerators

All types of refrigerators and freezers should have controls capable of maintaining safe temperatures. ST

3.5.18 Cleaning and maintenance

Refrigeration components should be accessible for necessary cleaning and maintenance. ST

Hot holding equipment

3.5.19 Temperature measuring devices

Temperature measuring devices should be graduated in increments of 1°C (33.8°F) or less over the range of 60°C (140°F) to 80°C (176°F). ST

Ice cube making machine

3.5.20 Protection of

- The lids and doors on ice cube making machines should be kept ST

ice pans and bins

closed when not in use.

- When top openings into ice pans and bins are subject to potential overhead contamination from drink dispensers or water stations, they should be protected during use and holding. ST
- Ice scoops should be stored in a hygienic manner so as not to contaminate the ice. The hand contact parts of the ice scoop should not be allowed to come into contact with ice. ST
- Ice cubes should normally be stored inside the machines. They may be transferred to a clean lidded ice bin/container for transport or service when required. ST

3.5.21 Use of potable water

Potable water must be used for making ice cubes. RQ

Sinks

3.5.22 Resistance to corrosion

Food and equipment washing sinks must be made of a durable material and corrosion-resistant particularly if they come into contact with chemicals. RQ

3.5.23 Materials

Sinks should be constructed from stainless steel or ceramics. ST

3.5.24 Drainage

Utensil washing sinks should be equipped with a draining board and splash back. ST

3.5.25 Design

Utensil washing sinks with three compartments (triple bowl) are preferred to single bowl or double sinks to allow an effective wash, rinse and disinfection operation. ST

3.5.26 Taps

- Every sink should have a supply of potable water at cold and hot temperatures (e.g. mixer taps or separate hot and cold taps). ST
- Sink taps should preferably open and close with non hand operated (elbow, knee, or foot) activation. ST

3.5.27 Separate sinks

- Separate sinks should be provided for food, utensil and hand washing. ST
- Hand washing facilities should be supplied as described in section 7.2. ST

Requirements of EU legislation
Regulation (EC) No 852/2004 on the hygiene of foodstuffs:
○ ***Chapter V, Paragraphs 1 (b and c) and 2***
1. All articles, fittings and equipment with which food comes into contact are to:
a. be so constructed, be of such materials and be kept in such good order, repair and condition as to minimise any risk of contamination

b. with the exception of non-returnable containers and packaging, be so constructed, be of such materials and be kept in such good order, repair and condition as to enable them to be kept clean and, where necessary, to be disinfected.

2. Where necessary, equipment is to be fitted with any appropriate control device to guarantee fulfillment of this Regulation's objectives.

○ ***Chapter II, Paragraph 2***

Adequate facilities are to be provided, where necessary, for the cleaning, disinfecting and storage of working utensils and equipment. These facilities are to be constructed of corrosion-resistant materials, be easy to clean and have an adequate supply of hot and cold water.

Regulation (EC) No 1935/2004 (Article 3) on materials and articles intended to come into contact with food:

Materials and articles shall be manufactured in compliance with good manufacturing practice so that, under normal or foreseeable conditions of use, they do not transfer their constituents to foodstuffs in quantities which could:

- endanger human health; or
- bring about an unacceptable change in the composition of the foodstuffs; or
- bring a deterioration in the organoleptic characteristics thereof.

3.6 Cleaning, disinfection and storage of working utensils and equipment

Cleaning is the removal of food residues, dirt, grease and other undesirable soiling and debris. The risk of contamination of food by pathogenic microorganisms is reduced when utensils and equipment are kept clean. It is a legal requirement (Regulation (EC) No 852/2004) to keep premises, equipment, utensils and materials clean to help to ensure the safety of food. Disinfection is used in order to reduce the number of pathogenic and other microorganisms to safe levels by using physical or chemical means. Applying appropriate methods of cleaning and disinfection to work surfaces and utensils can control the number of pathogenic microorganisms present. Therefore, cleaning and disinfection are an essential and integral part of a ship food operators safe functioning.

Item	Details	RQ/ST
	Cleaning and disinfection	
3.6.1 Cleaning and disinfection of utensils and equipment	• All utensils and equipment that may come into contact with food must be kept clean (see item 3.6.4). • All utensils and equipment that may come into contact with high risk food should be disinfected after cleaning (see item 3.6.6).	RQ ST
3.6.2 Cleaning Schedule/Plan	• In a ship food operation, a suitable Cleaning Schedule or Plan should always be in place. • Cleaning Schedule/Plan records should be maintained and be available for inspection.	ST ST

Cleaning Schedule/Plan

This should include:

- the areas, surfaces or items to be cleaned;

- the types of cleaning materials to be used;
- the methods of cleaning and disinfection;
- the frequency of cleaning (before/after use, daily, weekly, monthly);
- any safety precautions for crew required;
- a signature of the person responsible for cleaning and disinfection;
- a signature of the supervisor/manager responsible for ensuring and checking the standards of cleaning.

3.6.3 Cleaning frequency

- Utensils and equipment should be cleaned both between tasks and during any food handling when cross contamination could occur, such as after contact with high risk foods. ST
- Food temperature measuring devices (e.g. temperature probes) should be cleaned and disinfected before use. ST

Methods of cleaning utensils

3.6.4 Manual washing method

- A sink with at least three compartments should be used for manual utensil washing. ST
- In any operations where this is not possible the sink should be cleaned and disinfected between uses to ensure that effective washing, rinsing and disinfection can be maintained. ST
- Manual washing should include the five stages listed below: ST
  - **Pre-cleaning**: removal of food waste by scraping, sweeping, wiping or pre-rinsing. Pre-soaking may also be used to help effective cleaning.
  - **Main cleaning** (first sink): loosening of surface waste and grease using hot water, detergent and brushes.
  - **Rinsing** (second sink): removal of any detergent traces using clean water.
  - **Disinfection** (third sink): killing of microorganisms to a safe level as described in item 3.6.6.
  - **Drying**: using suitable techniques (e.g. air drying).

3.6.5 Dish/pot/glass washing machine

Machine dish/pot/glass washing should follow the five stages listed below: ST

- **Pre-cleaning**: removal of food waste manually before loading the machine.
- **Main cleaning**: with clean hot water and detergent.
- **Rinsing**: removal of detergent using clean water. Normally known as 'intermediate rinse' in many conveyor and 'flight' type machines.
- **Disinfection**: killing microorganisms as described in point 3.6.6. Normally known as the 'final rinse' in many conveyor

and 'flight' type machines.
- **Drying**: air drying. This may be achieved by blown warm air in some machines.

Disinfection

3.6.6 Methods of disinfection

- Utensils and equipment that come into contact with food should be disinfected using one or more of the following: ST
  - hot water at a minimum temperature of 77°C (171°F) or above for at least 30 seconds (manual washing) or 82°C (179.6°F) (this is dish washing machine water temperature at the manifold);
  - steam (steam can be unsuitable for machines and systems containing plastic materials which are destroyed by high temperatures);
  - a chemical disinfectant in accordance with manufacturer's instructions.
- Personal Protective Equipment (PPE) should be used where necessary in order to avoid scalding. ST

Cleaning equipment

3.6.7 Maintenance

Cleaning equipment should be kept clean and well maintained. ST

Use of cleaning equipment

3.6.8 Safety of cleaning chemicals

Cleaning and disinfection chemicals used in food areas should be food safe and designed for use on food contact surfaces. ST

3.6.9 Correct use of cleaning chemicals

- Cleaning chemicals should be used in accordance with the manufacturer's instructions (e.g. contact time, concentration, doses etc.). ST
- Surfaces to which cleaning chemicals have been applied should be rinsed with clean water. Some cleaning chemicals can be left on surfaces when this is indicated in the manufacturer's instructions. ST
- Disinfectants do not have cleaning properties and they should not be used as detergents. However, some cleaning chemicals such as detergent-sanitisers may do both tasks and this will be indicated in the manufacturer's instructions. ST

Storage of utensils and equipment

3.6.10 Storage

Only utensils and equipment for food preparation and service should be stored in food handling and preparation areas. ST

3.6.11 Protection

- Loose and portable equipment should not be stored in direct contact with the deck. ST
- The utensils and equipment stores should be kept clean and dry. ST
- Utensils and equipment should be kept covered or otherwise protected from dirt and condensation. ST
- Equipment should be protected against contamination. ST

Frequency of cleaning and disinfection of equipment

3.6.12 Cleaning frequency of equipment

Cleaning equipment should be cleaned: ST

- after each use;
- throughout the day at a frequency to help reduce any risk of contamination.

Storage of cleaning equipment

3.6.13 Storage of cleaning equipment

- Cleaning equipment should be stored in a separate area, cupboard or locker away from food or food contact surfaces. ST
- Storage rooms should be dry, clean and well ventilated. ST

3.6.14 Storage of cleaning chemicals

Cleaning chemicals should be stored in a cupboard or locker and away from food or food contact surfaces (see Chapter 8). ST

Requirements of EU legislation
Regulation (EC) No 852/2004 on the hygiene of foodstuffs:

- ***Chapter II, Paragraph 2***

Adequate facilities are to be provided, where necessary, for the cleaning, disinfecting and storage of working utensils and equipment. These facilities are to be constructed of corrosion-resistant materials, be easy to clean and have adequate supply of hot and cold water.

- ***Chapter V, Paragraphs 1 (a, d) and 3***

1. All articles, fittings and equipment with which food comes into contact are to:
a. be effectively cleaned and, where necessary, disinfected. Cleaning and disinfection are to take place at a frequency sufficient to avoid any risk of contamination
b. be installed in such a manner as to allow adequate cleaning of the equipment and the surrounding area.
2. Where chemical additives have to be used to prevent corrosion of equipment and containers, they are to be used in accordance with good practice.

- ***Chapter IX, Paragraph 5***

Food businesses manufacturing, handling and wrapping processed foodstuffs are to have suitable rooms, large enough for the separate storage of raw materials from processed material and sufficient separate refrigerated storage.

4. POTABLE WATER SAFETY

Ships must provide an adequate supply of safe water for drinking, washing, preparing food, supplying recreational water features such as swimming pools and spa, for fire control, steam production, dishwashers, laundry, air conditioning, boilers, deck washing, toilets, hair/beauty treatments and refrigeration. Drinking water (potable water) consumed by passengers or crew must be provided under good hygienic conditions. It should be of an appropriate quantity and of a quality that it will not cause immediate or long term harm to people drinking it. In particular, it must be free from any microorganisms, parasites, chemicals or other substances which, in the numbers or concentrations present, constitute a risk to human health. Waterborne disease outbreaks may occur on passenger ships due to failures in water safety systems.

Water is usually sourced from potable supplies on shore or generated at sea from sea water. Ensuring safe bunkering of water is essential to reducing potential risks for passengers and crew. For water supplied from a recognised water utility, the microbiological and chemical quality is the responsibility of the producer. However, ships must ensure that bunkered water is of potable quality, as well as ensuring that the actual process of bunkering, distribution and storage of water within the ship is safe and prevents chemical or microbial contamination. In line with the WHO and International Water Association (IWA) guidance, the systems and controls for the provision of safe water on passenger ships should be included within an overall Water Safety Plan (World Health Organization, 2008).

Guidance on production and use of Water Safety Plans (WSP) is included in Annex 15. This suggests a systematic risk assessment based approach to water safety management similar to that used in HACCP systems in food operations.

4.1 Introduction to Water Safety Plan

The management of potable water on ships should cover design, construction, commissioning, operation, monitoring and maintenance, in order to ensure that there are hygienic safeguards for the whole water supply process. The WHO has developed a HACCP like system for drinking water called a WSP and SHIPSAN has adopted this approach for managing potable water quality on passenger ships.

Requirements (RQ)/recommended standards (ST)

Item	Details	RQ/ST
	Water Safety Plan (WSP)	
4.1 WSP	• Passenger shipping operators should apply hazard analysis principles and implement a WSP in order to ensure the safety and quality of potable water that is provided to consumers.	ST

- The WSP steps include: ST
  a. System assessment
  b. Operational monitoring
  c. Management Plan

  and are described in Annex 15.

Team establishment

4.2 WSP team

A WSP team should be designated, consisting of a team leader and crew or other trained personnel responsible for the WSP implementation such as managers, engineers, water quality controllers, medical staff, facilities managers and technical crew. ST

4.3 Training

Crew or other personnel responsible for the application of the WSP should be trained and have adequate knowledge of the management of potable water systems, monitoring procedures, control measures, operational limits and corrective actions. An example of a training plan for crew is given in Annex 16. ST

4.2 System assessment

Item	Details	RQ/ST
	System assessment	
4.4 System assessment	A system assessment should be conducted for the whole potable water supply system from supply to consumer including the sources of water, bunkering, treatment, storage and distribution.	ST
	Identification of possible hazards	
4.5 Possible hazards	During the system assessment, possible hazards should always include at a minimum: • faecal microorganisms such as *E. coli*, Enterococci, *Cryptosporidium* spp. and enteric viruses; • *Legionella* spp. and *Mycobacterium* spp.; • contamination by chemical agents caused by exposure to heavy metals, disinfection residual, disinfection by-products, pesticides, toxic volatile organic compounds (VOC); • physical agents: sediments and particulates, pipe materials, pipe and tank liner materials, sloughed biofilms or iron and manganese films.	ST

Identification of potentially hazardous events

All potential events or situations that could lead to the presence of a hazard must be identified and listed. Potentially hazardous events should be indicated in the flow diagram/table.

Item	Details	RQ/ST
	Identification of potentially hazardous events Possible hazardous events should include at a minimum:	
4.6 Contaminated source water	• Contaminated water sources from: ○ bunkered water from a potable supply; ○ sea water used to produce potable water on board.	ST
4.7 Contamination during loading	• Water contaminated during bunkering/loading by the filling hose, filling line, or shore side/barge connections.	ST
4.8 Contamination during storage	• Contamination of potable water during storage caused by: ○ ingress of foreign materials or other substances caused by improper design and construction of storage tanks; ○ sediment in storage tanks; ○ incorrect cleaning of tanks; ○ biofilm growth in storage tanks pipe work and fittings contributing to contamination with *Legionella*, *Pseudomonas aeruginosa*, *Mycobacterium* spp. and amoebae; ○ damaged or defective storage tanks or their linings; ○ ingress of foreign materials or other substances during maintenance or repair of storage tanks; ○ backflow (backpressure or back siphonage); ○ cross connection with technical, black or grey water systems; ○ bacterial growth as a consequence of poor temperature control or inadequate disinfection.	ST
4.9 Contamination through distribution system	• Contamination of potable water or microorganism growth in the distribution system, in particular due to: ○ backflow; ○ poor design and construction of piping system components; ○ existence of deadlegs/blindend in the distribution system; ○ damaged pipes; ○ chemical contamination through the use of the wrong distribution construction materials; ○ contamination during maintenance or the repair of piping system; ○ biofilm growth in pipe work and fittings contributing to contamination with *Legionella*, *Pseudomonas aeruginosa*, *Mycobacterium* spp. or amoebae; ○ contamination due to stagnant water in infrequently used outlets or other part of the water system where water remains	ST

stagnant for more than 7 days.

Control measures

4.10 Control measures

Suitable control measures should be identified for each potential hazardous event. ST

Water source

4.11 Supplier water quality reports

Where available and supplied to the ship any supplier water quality/safety reports should be checked for compliance with the Directive 98/83/EC requirements, before loading potable water (Annex 17). ST

4.12 Water quality tests

Routine basic water quality tests (pH, turbidity, free chlorine, *E. coli* test) should be performed before bunkering. ST

Water production (potable water)

4.13 Filtration of sea water

Sea water should be filtered to remove particulate matter before it is processed. ST

4.14 Risk assessment

When taking sea water for potable water production, every effort should be made to avoid the uptake of potentially contaminated water. A risk assessment should be performed to ensure that the water loaded for production is of appropriate quality. The uptake of sea water should be avoided in areas identified as polluted, in coastal waters and in very shallow water. ST

4.15 Equipment

Water making equipment should be fitted with an automatic halogenation unit. ST

4.16 Control of water generation system

The water generation systems should be fitted with a warning alarm and back-up halogenation pump that switches over automatically when the automatic primary pump breaks down. ST

4.17 Discharge of sewage and grey water

No discharge of any type of waste (for example sewage and grey water) should be allowed into an area from which sea water is used to produce potable water. ST

Bunkering

4.18 Equipment

When potable water is loaded from water boats or barges, these ships should operate equipment (tanks, hoses, pipe system, pumps) used exclusively for potable water. ST

4.19 Filling hoses

- Ships should be equipped with filling hoses that are exclusively used for potable water loading. ST

	• Equipment used to bunker or discharge any non-potable water should have incompatible fittings which cannot be used for the potable water supply system.	ST
4.20 Flushing	Hoses should be flushed for at least 3 minutes with potable water before use.	ST
4.21 Drainage and cap	Hoses should be kept clean and drained and capped at both ends or otherwise protected after use.	ST
4.22 Avoidance of contamination	Hoses should be handled with caution to avoid contamination from the ground, pier or deck surfaces or from the harbour water.	ST
4.23 Storage in lockers	• Hoses should be stored in lockers used exclusively for this purpose. The lockers should be marked POTABLE WATER HOSE ONLY with letters at least 1.3 cm high.	ST
	• Lockers should be placed at least 45 cm above the deck and should be made of non-toxic, non-corrosive material.	ST
4.24 Disinfection	Hoses should be disinfected at least every 6 months (e.g. superchlorinated with water at 100 mg/L with a contact time of 1 hour), or whenever contamination has occurred.	ST
4.25 Caution on cross connection	There should be no cross connection from the potable water filling line to any non-potable piping system. The potable water filling line should not pass through any non-potable water piping system or through a non-potable liquid.	ST
4.26 Labelling of filling line	The filling line should be marked with POTABLE WATER FILLING in letters at least 1.3 cm high stamped on a non-corrosive material.	ST
4.27 Colour of filling line	The filling line should be painted blue or striped with light blue bands or a light blue stripe or as per ISO 14726.	ST
4.28 Disinfection during bunkering	Chemical disinfection of potable water during bunkering should involve using an agent which produces a halogen residual disinfectant. The halogen residual disinfectant concentration should be at least 2.0 mg/L at the time of bunkering. Alternative disinfection methods can be acceptable provided a scientific assessment is conducted to ensure its efficacy is established.	ST
	Storage	
4.29 Storage tank construction	Every potable water storage tank should be provided with a vent located and constructed so as to prevent the entrance of any contaminating substances. The vent or combined vent and overflow should terminate with the open end pointing downward and should be suitably protected (for example screened with a corrosion-resistant and vermin-proof mesh screen).	ST

4.30 Coating materials	The coating materials of storage tanks should not be toxic or allow any contamination of potable water by toxic substances.	ST
4.31 Caution on cross connection	No cross connections should exist between storage tanks and the non-potable water systems.	ST
4.32 Ease of cleaning and maintenance	Potable water storage tanks should be accessible for cleaning repair and maintenance.	ST
4.33 Non-potable piping systems and potable water tanks	Piping systems carrying sewage or other non-potable liquids should not pass through potable water tanks.	ST
4.34 Labelling of potable water tanks	Potable water tanks should be identified with the words "POTABLE WATER" in letters at least 1.3 cm high.	ST
4.35 Ventilation and cleaning	Water storage tanks should be opened up, emptied, ventilated and cleaned at a suitable frequency based upon the findings of operational monitoring and inspections.	ST
4.36 Hygienic codes of practice	• Hygienic practices and procedures for regular maintenance and repair work should be used and records kept available for inspection.	ST
	• During cleaning, maintenance or repair the workers should have written procedures for physical cleaning and disinfection of potable water tanks.	ST
4.37 Post-repair disinfection	Post repair tank cleaning and disinfection should always be carried out.	ST
4.38 Separation of potable and non-potable water tanks	• Potable water tanks should not have any common partition with a tank holding non-potable water or other liquids.	ST
	• Any ship with tanks which are not independent from the shell of the vessel (skin tanks) must have suitable protection and safety measures in place to prevent any potential contamination of the stored potable water.	RQ

Distribution system

4.39 Colour of potable water piping	Potable water piping should be painted blue or striped with light blue bands or in accordance with ISO 14726, at 5 metre intervals. It should show the direction of flow of the potable water with an arrow.	ST
4.40 Avoidance of sewage or tanks holding non-potable liquids	Potable water piping should not pass under or through sewage or tanks holding non-potable liquids.	ST
4.41 Protection against back flow	• The system should be protected against back flow by either back	ST

flow preventers (e.g. vacuum breakers) or air gaps.

- Testable backflow prevention assemblies should be tested after installation and at least every 12 months or in accordance with the manufacturer's instructions. ST

4.42 Disinfectant halogen residual

The disinfectant halogen residual should be maintained at a minimum of 0.2 mg/L and not more than 5.0 mg/L of free chlorine in all sites of the distribution system (see also item 4.45). Alternative means of disinfection can be acceptable provided a scientific assessment is conducted to ensure its efficacy is established. ST

4.43 Coating materials

Coating materials used in the piping system should not introduce toxic substances to the potable water. ST

4.44 Maintenance and repair

Hygienic practices and procedures for maintenance and repair work should be used. During maintenance or repair the workers should have written procedures for repair and maintenance of piping systems. The relevant section of the system needs to be disinfected following any repair works. ST

4.45 Maintenance of temperature in cold water distribution system

In cold water distribution systems, water temperatures should ideally be maintained at less than 25°C (77°F) throughout the system to provide effective *Legionella* control. However, this may not be achievable in all systems, particularly those in hot climates. Maintaining residual disinfection at >0.5 mg/L free chlorine, or alternative disinfection methods and technology, will contribute to the effective control of *Legionella* in such circumstances. ST

4.46 Hot water distribution system temperature

Throughout the hot water distribution systems, water temperatures should exceed 49°C (120°F). ST

4.47 Insulation of pipes and storage tanks

All pipes and storage tanks should be insulated, when necessary, to help ensure that water is maintained, as far as possible, outside the temperature range of 25°C (77°F) - 49°C (120°F) to minimise the risk of *Legionella* growth. ST

4.48 Heating and refrigeration

- Heaters should be set up so as to ensure hot water is delivered to all hot water taps at above 49°C (120°F) and that the water temperature on return to the calorifier/heater is above 49°C (120°F). ST
- Where cold water is regularly held and distributed at above 25°C (77°F) then refrigeration may be considered. ST

4.49 Prevention of scalding	• To prevent scalding, signs may be displayed to warn users about the risk. • In nursery and play areas temperature limiting valves or alternative safety measures may be used for taps in children facilities to avoid scalding.	ST ST

4.3 Operational monitoring

Control measures should be monitored in order to spot any deviations from the operational limits. Operational monitoring should include measurement of selected water parameters, and the equipment and construction inspection procedures. Operational monitoring should provide early warning of failure of halogenation or any other operational limit violations to enable effective water system management. In most cases, operational monitoring involves basic water quality tests (pH, halogen residuals) and routine hygienic inspections.

An operational monitoring plan should be put in place and include the following basic elements:

- Define the sampling points and frequency of sampling.
- List the equipment required for monitoring water systems.
- Establish the monitoring equipment standards (calibration, certification).
- Ensure compliance with standard methods of water examination.
- Define the locations to be inspected and frequency of inspections.
- Define the required qualifications of crew carrying out the monitoring.

Item	**Details**	**RQ/ST**
	Operational limits	
4.50 Parameters	The following parameters should always be monitored.	ST
	Operational monitoring parameters	
4.51 Measurement of free halogen	• Free halogen residual at a far point of the distribution system should be measured continuously, with the use of a halogen analyser chart recorder or electronic data logger. **Operational limit:** More than 0.2 mg/L and less than 5.0 mg/L.	ST
4.52 Monitoring of free halogen during bunkering	• During bunkering the free halogen residual should be monitored hourly. This can be checked manually using a test kit or spectrophotometer, or automatically by using probes and data logging equipment. **Operational limits:** More than 2.0 mg/L and less than 5.0 mg/L.	ST

4.53 Measurement of pH and turbidity before bunkering

- Before bunkering pH and turbidity should be measured in order to evaluate the effectiveness of the halogenation process. ST

  Operational limits: pH within the range of 7.0 to 7.8 and turbidity less than 1 NTU.

4.54 Measurement of pH of water in the distribution system

- The pH of water in the distribution system should be measured periodically in order to evaluate the effectiveness of the halogenation process. ST

  Operational limits: pH within the range of 7.0 to 7.8.

4.55 E. coli test

- A water sample for *E. coli* testing should be taken from the supplied water before bunkering. Alternatively, a copy of the most recent microbiologic report from each port should be obtained and held on board for a minimum of 12 months. If a vessel bunkers potable water from the same port more than once per month only one test per month is required. ST

  Operational limits: negative test result before the water is used or a negative port report for *E. coli*.

4.56 Measurement of temperature

- For recirculation hot water systems, the temperature of the water leaving and returning to the heater should be measured daily. ST

  Operational limits: Temperature of water less than 25°C (77°F) or more than 49°C (120°F) at any point.

4.57 Inspection of loading procedures and equipment

- Bunkering and water loading procedures should be checked monthly and all potable water equipment inspected monthly in order to ensure that the standards are met. ST

  Operational limits: Appropriate handling of filling hose, incompatible fittings system of the filling hose or line with any non-potable water, appropriate storage of the filling hoses, adequate labelling, appropriate construction materials, cross connections not found.

4.58 Inspection of potable water tanks

- Potable water tanks should be inspected after installation and at least once every 24 months in order to identify potential defects or inadequate functioning. ST

  Operational limits: Absence of dirt inside the tank, water does not appear turbid, inspection covers are not damaged and are in place, absence of cracks in tank structure, proper construction materials, cross connections not found.

4.59 Inspection of storage tanks

- Potable water storage tanks should be inspected during and after repair and maintenance. ST

Operational limits: Proper repair, maintenance or cleaning procedures observed.

4.60 Testing of backflow prevention

- Testable backflow prevention assemblies should be tested after each installation and at least every 12 months or in accordance with the manufacturer's instructions. ST

  Operational limits: No defects in the backflow prevention assemblies spotted during testing.

4.61 Inspection of the piping system

- Visual inspections of the potable water distribution systems (pipes, connections) should be conducted routinely – ideally every 12 months where practible, or during routine maintenance. ST

  Operational limits: Absence of leakage, corrosion or cross connections.

4.62 Repair and maintenance of piping system

- The potable water distribution system should be inspected during repair and maintenance. ST

  Operational limits: Proper maintenance and repair procedures observed.

4.63 Inspection of tanks

- Potable water tanks should be inspected after installation and at least once every 2 years. ST

  Operational limits: No defects or inadequate functioning.

4.4 Management Plan

Item	Details	RQ/ST
	Corrective actions	
4.64 Corrective actions	When operational monitoring shows that the existing control measures are not operating effectively, corrective actions should be taken to ensure the system is functioning safely again as soon as possible.	ST
	Verification monitoring	
4.65 Microbiological indicator parameters	• The microbiological quality of the water supplied for human consumption on passenger ships must be verified on a regular basis.	RQ
	• The following indicator parameter must be measured regularly: ○ *E. coli* (The presence of *E. coli* in the water distribution system must be checked by taking 4 random potable water samples a month for testing).	RQ
	• It is recommended that water samples are checked for *Legionella* spp. This microbiological examination should be conducted every 6	ST

months or more frequently according to the findings of the risk assessment of the WSP. More information can be found in Guideline III of Part B.

- Additional indicator parameters should be measured regularly depending on any specific water risks which are identified by the ship. These parameters may include Enterococci (monthly). ST

4.66 Chemical indicator parameters

- The chemical quality of water supplied for human consumption must be verified on a regular basis. RQ
- It is recommended that the levels of the following chemical/metals are checked routinely. The frequency should be based on risk assessment: ST
  - turbidity (monthly);
  - pH (daily);
  - aluminum (once a year);
  - iron (once a year);
  - lead (once a year);
  - cadmium (once a year);
  - copper (once a year).
  - Additional indicators should be examined depending on any specific water risks which are identified by the ship.

4.67 Halogen analyser calibration and maintenance

- Halogen analyser chart recorders or electronic data loggers should be checked and calibrated when necessary and maintained according to the manufacturer's instructions. ST
- A manual comparison test should be conducted daily to verify the calibration is correct. ST
- The free residual halogen measured by the halogen analyser should be within ±0.2 mg/L of the free residual halogen measured by the manual test. The halogen analyser should be recalibrated if there is more than a 0.2 mg/L difference between the two readings. ST
- The daily, manual comparison test or calibration should be recorded either on the recorder analyser chart or in a suitable log. ST
- The test kit used to calibrate the halogen analyser should be graduated in increments no greater than 0.2 mg/L in the range of free residual halogen normally maintained in the potable water system. ST

Record keeping

4.68 Record keeping

The WSP should always include record keeping procedures including the following: ST

- water safety parameters monitored on the ship;
- the outcome of routine inspections and any incident investigations

on the ship;

- details of training programmes and courses for crew or other personnel;
- details of any water safety certifications (for materials, equipment, chemicals etc.) kept on the ship;
- the monitoring programme for the ship (as recommended in items 4.50-4.63);
- a list of water treatment methods used on the ship (disinfection, filtration, mineralisation etc.);
- calibration records of equipment used to monitoring the main control measures and the operational equipment used at the control measures.

4.69 Duration of water record keeping

Potable water safety records should be kept for at least 12 months on board and be available for inspection. ST

Requirements of International and EU legislation

Directive 98/83/EC (Article 4) on the quality of water intended for human consumption:

Water intended for human consumption shall be wholesome and clean if it:

1. is free from any microorganisms and parasites and from any substances witch, in numbers or concentrations, constitute a potential danger to human health

2. meets the minimum requirements set out in Annex I*, Parts A and B of EC DIRECTIVE 98/83/EC

Regulation (EC) No 852/2004 (Chapter VII) on the hygiene of foodstuffs:

There is to be an adequate supply of potable water, which is to be used whenever necessary to ensure that foodstuffs are not contaminated.

Where non-potable water is used, for example for fire control, steam production, refrigeration and other similar purposes, it is to circulate in a separate duly identified system. Non-potable water is not to connect with, or allow reflux into, potable water systems.

Maritime Labour Convention, 2006 Regulation 3.2 – Food and catering

Purpose: To ensure that seafarers have access to good quality food and drinking water provided under regulated hygienic conditions

1. Each Member shall ensure that ships that fly its flag carry on board and serve food and drinking water of appropriate quality, nutritional value and quantity that adequately covers the requirements of the ship and takes into account the differing cultural and religious backgrounds.

5. RECREATIONAL WATER SAFETY

Recreational Water Facilities (RWFs) on board passenger ships include outdoor and indoor swimming pools, hot tubs and spas, and wading and splash pools which are normally associated with children's activities. A number of infectious diseases can be acquired in RWFs that can cause diarrhoea, or skin, ear, eye or upper respiratory tract infections. Enteric pathogens such as *Cryptosporidium parvum* have commonly been associated with RWFs, but other pathogens can be involved including *Legionella* spp. and *Pseudomonas aeruginosa*. Pathogens can enter the pools from bathers, from the sea in salt water pools, through the use of contaminated potable water in potable water pools, or through sewage contamination. A comprehensive set of guidelines is available that provides best practice for running swimming pools (Pool Water Treatment Advisory Group, 2009).

Special care and management of RWFs is needed in order to provide a safe and hygienic environment that does not facilitate communicable diseases transmission. Appropriate management includes treatment (including disinfection and filtration), regular cleaning, daily inspections and a maintenance plan.

Requirements (RQ)/recommended standards (ST)

Item	Details	RQ/ST
	Management	
5.1 Documentation of Management Plan	Each ship should have a documented Management Plan or written procedures for all RWFs on board. These should consist of at least the following:	ST
5.2 Treatment Plan	• A Treatment Plan or procedures containing at least the description and documentation of: o treatment processes (disinfection, filtration, etc.); o disinfectant residual used; o filter type and filter rate; o backwash procedure and frequency.	ST
	• It should be consistent with recommended standards given in items 5.13 to 5.23.	ST
5.3 Monitoring Plan	• A Monitoring Plan or procedures containing at least a description and documentation of: o water quality indicators; o sampling and testing procedures (test kits etc.); o frequency of sampling and recording; o corrective actions in case of adverse results.	ST

Requirements and recommended standards for monitoring are given in items 5.24 to 5.31.

5.4 Cleaning Plan

- A Cleaning Plan or procedures containing a cleaning programme for each RWF (see items 5.32 to 5.33). ST

5.5 Maintenance Plan

- A Maintenance Plan or procedures containing a maintenance programme for each RWF (see items 5.34 to 5.37). ST

5.6 Emergency Plan

- An Emergency Plan or procedures containing the response plan for emergencies such as accidental injuries (first aid kit and auxiliary equipment). ST

5.7 Accidental Faecal /Vomit Release Plan

- There should be a plan or procedures for dealing with vomit or faecal accidents (e.g. based on the model version in Annex 18). ST

5.8 Record keeping

RWF records should be kept on board and be available to inspectors for at least 12 months. A complete list for record keeping is given in Table 1 (page 94).

Operational Mode of RWFs

5.9 Water source

The water source for recreational water facilities may be either sea water or potable water. ST

5.10 Potable water pools and sea water recirculating pools

When either potable water or recirculated sea water is used the water should be circulated through an appropriate treatment system that contains at least filtration, coagulation and halogenation or alternative means of disinfection. ST

5.11 Turnover period

For RWFs in recirculating mode the circulation rate of water should be such that the turnover period does not exceed the values given below: ST

Recreational water facility	**Maximum turn over period**
Swimming pools	3-6 hours
Hot tubs/spas	1 hour
Leisure waters up to 0.5 m deep	45 minutes
Leisure waters 0.5-1 m	1.25 hours
Leisure waters 1-1.5 m deep	2 hours
Leisure waters over 1.5 m deep	2.5 hours

5.12 Salt water pools: flow-through pools

- Some ships operate in a flow through mode, but flow-through sea water supply systems for swimming pools that do not have recirculation should only be used while the vessel is moving at sea. ST
- When a ship is operating a flow through pool, every effort should be made to avoid the uptake of potentially contaminated water. An assessment should be performed to ensure that the water is of appropriate quality. The uptake of sea water should be avoided in areas identified as polluted, in coastal waters and in very shallow water. ST
- If a ship is operating a flow through pool, the pool water supply should be shut off or closed 20 kilometres (10.8 nautical miles) from land and then either changed to recirculation mode or drained. ST
- Flow through pools should remain empty while in port and not refilled until the ship is 20 kilometres (10.8 nautical miles) from land. ST
- For continual use while in port RWFs should be switched to a recirculation mode that includes a filtration and halogenation system or alternative disinfection system. ST
- Prior to opening the RWF to the public, the required free residual halogen and pH levels should be achieved. ST

Water treatment

The treatment system for RWFs should include the following: ST

a. Filtration

5.13 Backwashing

- All sand filters should be backwashed as recommended by the filter manufacturer/supplier, when the allowable turbidity value has been exceeded, when a certain length of time, as defined by risk assessment and manufacturers guidelines, without backwashing has passed or when a pressure differential is observed. Backwashing should take place when the pool is not in use at the end of the day. ST
- Since the pressure differential between inlet and outlet of the sand filter increases as materials accumulate in the filter, it can be used as an indication for backwashing. ST

5.14 Back wash water

The backwash water is regarded as waste and should be discarded to the waste system. ST

5.15 Filter medium

The filter medium should be examined regularly and changed as recommended by the manufacturer/supplier. ST

b. Disinfection

5.16 Disinfectant choice

Halogenation with chlorine or bromine should be used. Alternative means of disinfection with residual effect may also be used. ST

5.17 Automatic dosing

Disinfection should be automatically controlled and a monitoring system incorporated. ST

5.18 Residual disinfectant

- Dosing of halogen disinfectant should be such that a residual is maintained in the water at all times between the acceptable limits given in Table 2 (page 95). ST
- Halogenating systems should be operated and well maintained. The halogen levels in RWFs' water should be tested. ST
- Residual halogen logs should be maintained with residuals measured and recorded every 4 hours during operation. ST
- Halogen analyser-chart recorders can be used in lieu of manual tests. These should be checked daily and where necessary calibrated and the calibration recorded on the chart or in a log book. ST
- Electronic data loggers with certified data security features are acceptable as an alternative record. ST
- A manual comparison test should be conducted daily to verify calibration. Calibration should be made whenever the manual test value is >0.2 mg/L higher or lower than the analyser reading. ST
- The daily, manual comparison test or calibration should be recorded either on the recorder chart or in a log book. ST
- The free residual halogen measured by the halogen analyser should be within ±0.2 mg/L of the free residual halogen measured by the manual test. ST
- The test kit used to calibrate the halogen analyser should be graduated in increments no greater than 0.2 mg/L in the range of free residual halogen normally maintained in the RWF. ST
- Logs and charts should contain records of any unusual water events with the swimming pool operation and any corrective actions taken. ST
- Logs and charts should be kept for at least 12 months for review during inspections. ST

5.19 Alternative methods

Alternative methods of disinfection can be employed (e.g. UV radiation or ozonation) but they should be combined with ST

halogenation in order for a residual to be maintained.

5.20 Ozonation

When ozonation is applied caution should be taken for the ozone release. Activated carbon should be used for deozonation of water. For indoor pools, ozone should not exceed 0.1 mg/m^3 in the atmosphere above the pool. ST

c. Coagulation

5.21 Coagulation as an option

Coagulation (the addition of chemicals known as coagulants) should be available for use where necessary in the treatment process to increase filtration efficiency. ST

d. pH adjustment

5.22 Automatic pH adjustment

- The pH value of RWFs' water should be maintained within the recommended range (Table 2, page 95) to ensure optimal treatment. ST
- There should be a routine pH measurement and an automatic pH adjustment. ST

e. Addition of fresh water

5.23 Addition of fresh water – (dilution of pollutants)

The treatment process should also include the addition of fresh water at frequent intervals. The recommended rate is 30 L per bather per day. ST

Monitoring

5.24 Water quality parameters

The water quality parameters which are listed in Table 2 (page 95) and Table 3 (page 96) should be monitored according to the given frequency and should be within the acceptable ranges. ST

5.25 Test kits

Test kits for measuring free halogen residual, pH and total halogen should be available (a cyanuric acid test kit is also required when using a cyanurate for disinfectant stabilisation). The test kits should be cared for and used by trained individuals. ST

5.26 Sampling procedures

It is recommended that the sampling procedures given in Annex 19 are used. ST

5.27 Record keeping of chemical tests

All chemical tests conducted should be documented and made available during inspections (Table 1, page 94). ST

5.28 Periodic

For chemical parameters read by controllers and adjusted ST

checks of controllers

automatically, the operator should conduct periodic checks according to Table 2 (page 95) and Table 3 (page 96) to ensure that electronic readouts agree with the water tests.

5.29 Calibrations

Calibrations of automatic controllers should be regularly conducted as per the manufacture's/supplier's instructions, or whenever there is a significant difference between electronic readings and chemical tests. ST

5.30 Halogen and pH analyser charts

Electronic readouts of halogen residual and pH should be recorded and should be available during inspections. ST

Corrective actions

5.31 Corrective actions

- When water parameters are out of acceptable limits bathers must leave the pool and the RWF must be closed. RQ
- An investigation should be conducted and corrective action taken and recorded. Records should be kept for the remedial actions taken. Suggestions for an investigation and remediation plan are given in Annex 20. ST

Cleaning

5.32 Cleaning of RWFs

- RWFs should be kept clean. ST
- Regular cleaning of RWFs is required and should include draining of the pools, scrubbing tub walls, cleaning skimmers, and all removable parts. ST

5.33 Cleaning materials

Cleaning materials should be compatible with pool materials and water treatment chemicals. ST

Equipment maintenance

5.34 Pool hydraulics

Pool hydraulics and equipment should be checked regularly in order to ensure their good operational state. ST

Periodic checks of equipment

5.35 Equipment requiring periodic checks

Periodic checks and maintenance should be carried out for: ST

- filter equipment including pressure gauges and flow meters; ST
- water pumps; ST
- chemical feeders and controllers; ST
- overflow system; ST
- gates (inlets and outlets): gates should be securely maintained over outlet drains and other suction outlets to prevent bather ST

entrapment;

- air ventilation system (for indoor pools): adequate ventilation should be provided in closed environments for the exhaust of volatile chemicals (at least 10 L of fresh air/m^2 of water surface). ST

5.36 Operability of components

All mechanical components should work as per manufacture's/supplier's instructions. ST

5.37 Operating manuals on board

Operating manuals for all RWFs should be maintained in a location that is known and accessible. ST

Special and additional requirements for hot tubs/spas

For spa and whirlpool pools the following additional requirements should be applied: ST

5.38 Thermometers – automatic control

- Thermometers and automatic mechanisms that control the temperature to below 40°C (104°F) should be installed. ST
- The hot tubs/spas should not exceed a water temperature of 40°C (104°F). ST

5.39 Spa timer

- Use of a spa timer is recommended (maximum recommended time 15 minutes). ST

5.40 Emergency shut off

- An emergency shut off systemshould be available for users. ST

5.41 Weekly thorough cleaning

- Routine cleaning of hot tubs, spa pools and associated equipment (flexible hoses, balance tanks, water lines, etc.) should be carried out. ST

5.42 Monthly cleaning of jets

- Where present the air jets should be removed, inspected and cleaned once a month. ST

5.43 Daily filter inspection

- Filters should be checked on a daily basis. ST

5.44 Filter backwashing

- Sand filters should be backwashed daily. Diatomaceous earth filters should be backwashed according to the manufacturer's instructions. ST

5.45 Hourly disinfectant monitoring

- Disinfectant levels should be monitored hourly when the pool is operating. ST

5.46 Spa connected to swimming pool

- If a spa pool is connected with a swimming pool and uses the same operational equipment, then the rules for turnover periods ST

and disinfectant levels of spas should supersede those of the swimming pool.

5.47 Superhalogenation

- A daily shock treatment (superhalogenation) should take place at the end of the day by increasing the disinfectant level to at least 10 mg/L for 1 hour or an equivalent combination of time and concentration. ST

5.48 Heating to 70 °C (158°F)

- Alternatively the spa water may be heated to 70°C (158°F) on a daily basis when the unit is closed. ST

5.49 Draining

- A complete draining, cleaning and renewal of water should be done at least on a daily basis. ST
- When daily complete draining is not practical or feasible (for example due to environmental law restrictions for discarding treated water to the sea), then complete draining should take place at least every 72 hours in small spa pools and hot tubs. Larger spa/hydrotherapy pools should be drained and cleaned at least weekly. ST

5.50 Circulation

- The water circulation and treatment system should be operated when the pool is open to the public. ST

Swimmers safety and hygiene

5.51 No glass on the sides

Areas adjacent to swimming pools should be free from any glass objects, cans and items that can cause injuries. ST

5.52 No water accumulation

There should be no water accumulation on the sides of the pool. ST

5.53 Drains, pool spouts and anti-entrapment device

- There should be no uncovered drains or exposed pool spouts. ST
- Grilles and drain gates (anti-entrapment devices) should be placed on all inlets and outlets or wherever hair entrapment might occur. ST
- Grilles on outlets should have gaps less than 0.8 cm. ST
- Grilles on outlets should be certified by an accredited institute. ST
- Swimming pools and hot tubs/spas should not be used if any of the anti-entrapment devices are missing, unsecured or damaged. ST

5.54 Emergency shut off pump

The pump should have an accessible emergency shut off mechanism. ST

5.55 Lifesaving equipment

Lifesaving equipment (at least a Shepherds hook of appropriate size and floating devices) should be mounted in a conspicuous location and be plainly marked "For emergency use only". ST

5.56 Marks for depth

Marks should notify the depth where it exceeds 1 m. ST

5.57 "No Lifeguard on duty" signs

Lifeguards should be present; otherwise a warning sign informing passengers that no lifeguard is on duty should be posted in plain view in clear legible letters (Annex 21). ST

5.58 "No diving" signs

Warning signs prohibiting diving should be placed in pools or areas of pools less than 1.8 m deep (Annex 21). ST

5.59 Bather load

- The allowable number of bathers should be posted in plain view. ST
- For calculating the maximum number of bathers that can use a swimming pool at a time, the following table should be used: ST

Water depth	Maximum bathing load
<1.0 m	1 bather per 2.2 m^2
1.0-1.5 m	1 bather per 2.7 m^2
>1.5 m	1 bather per 4.0 m^2

- For calculating the maximum bather load in hot tubs/spas, the following factor should be used: ST
  - One person per 20 L per minute of recirculation flow.

5.60 Bather hygiene

Signs for hygiene of bathers should be placed in plain view in the pool area and in the dressing rooms. Signs should request bathers not to swim when they have health problems and to take a shower before using the pool. ST

5.61 Other warning signs

Other signs that prohibit or discourage unsafe behaviour, warn susceptible people, prohibit use of the pool when experiencing diarrhoea, vomiting or fever or when persons are in nappies and encourage safe practices should be posted in plain view in the pool and in the dressing rooms. ST

5.62 Other safety issues

Other safety issues of RWFs are covered by SOLAS conventions. ST

Decorative fountains

5.63 Decorative fountain water

Potable water should be used as a source for decorative fountains. ST

5.64 Disinfection

Water should be disinfected with at least of 1 ppm chlorine or with another chemical disinfectant which provides a residual effect. ST

5.65 Repairing

All parts of the decorative fountains (pool, buffer tank, piping) should be maintained in good condition, clean and free from algae, sediment and salts. ST

Table 1: Recommended standards for record keeping for RWF

Section	Record Keeping	Details	Frequency
Treatment process	Water quality parameters	Date, time, test value of parameters	As stated
	Backwash	Date and time	Whenever needed and applied (see 5.13).
Equipment	Filter	Date, time, condition	Daily check of filters
	Filter media change	Date, time	Whenever a filter media needs to be changed.
	Maintenance work	Date, time, process, type of equipment	Whenever it is carried out – as manufacture's/supplier's advice. *This can be recorded in the engineering or other logs*
	Repair work	Date, time, description of problem and repair job	Whenever it occurs. *This can be recorded in the engineering or other logs*
Cleaning	Cleaning	Date	As applicable (e.g. weekly)
Emergencies	Accidental faecal or vomit releases	Date, time of closure, corrective actions taken, time of opening	Whenever it occurs.
	Water quality parameters out of limits	Date, time, parameter values, corrective actions taken	Whenever it occurs.
	Injuries/deaths. *This can be recorded in the medical log or other incident reports.*	Date, time, description of event and its reasons	Whenever it occurs.

Table 2: Physical, chemical and microbiological parameters tested in swimming pools and leisure water pools (excluding sea water flow through RWF)

Parameters	Acceptable Limits	Testing frequency
Physical		
Temperature/pools*	Recommended temperature: 25-28°C (77-82°F) Maximum temperature: 30°C (86°F)	Daily
Chemical		
Free disinfectant residual	1-5 mg/L Cl 2-5 mg/L Br 0.5-5 mg/L Cl (if ozonation is applied)	Every 4 hours
pH	7.0-7.8 for Cl disinfection 7.0-8.0 for Br disinfection	Every 4 hours
Turbidity*	<0.5 NTU	Daily
Alkalinity*	80-120 mg/L	Daily for fresh water pools Every week for other pools
Combined chlorine*	No more than half the free halogen concentration	Daily
Cyanuric acid (in case of chlorinated isocyanurates used)*	50-100 mg/L	Daily
Microbiological		
Heterotrophic Plate Count	<200 cfu/mL	At least every 2 months
E. coli, Pseudomonas aeruginosa	<1/100 mL	At least every 2 months
Other microbiological parameters*	Whenever there is an outbreak	

* Parameters tested optionally

Table 3: Physical, chemical and microbiological parameters tested in hot tubs/spas their acceptable limits and frequency of testing

Parameters	Acceptable Limits	Testing frequency
Physical		
Temperature/pools	<40°C (<104°F)	Every 4 hours
Chemical		
Free disinfectant residual	3-10 mg/L Cl 4-10 mg/L Br	Every 1 hour
pH	7.0-7.8 for Cl disinfection	Every 1 hour
	7.0-8.0 for Br disinfection	
Turbidity*	<0.5 NTU	Daily
Alkalinity*	80-120 mg/L	Every week
Combined chlorine*	No more than half the free halogen concentration	Daily
Cyanuric acid (in case of chlorinated isocyanurates used)*	50-100 mg/L	Daily
Microbiological		
Heterotrophic Plate Count	<200 cfu/mL	At least every 2 months
E. coli, Pseudomonas aeruginosa	<1/100 mL	At least every 2 months
Legionella spp.	<1/100 mL	At least every 3 months
Other microbiological parameters*	Whenever there is an outbreak	

* Parameters tested optionally

6. PEST MANAGEMENT

Passenger ships may provide conditions suitable for the survival and growth of pest populations. Insects, rodents and other pests can gain access directly from the ships' open and technical spaces, can be carried in shiploads, or can be found on humans or animals as ectoparasites. Pests on board ships may contaminate stored foods, transmit illness on board, or introduce diseases to different areas of the world. Early identification of their presence through use of an integrated pest management (IPM) system is important to avoid large infestations.

Requirements (RQ)/recommended standards (ST)

Item	Details	RQ/ST
	Integrated Pest Management Plan	
6.1 Pests	Ship companies must ensure that pest infestation is eliminated on ships for which they are responsible. Any introduction of pests onto the ship must be acted upon immediately.	RQ
6.2 IPM management team	• A designated pest management team should be established and trained so as to recognise common shipboard insects and rodents in every stage of their life cycle and know pests' behaviour.	ST
	• The team should have specific knowledge of pest surveillance methods and appropriate knowledge of housekeeping, effective sanitation, maintenance and safe use of pesticide application.	ST
6.3 IPM Plan content	An IPM Plan should be established and implemented as described in the following paragraphs.	ST
6.4 Responsibilities	Crew positions and responsibilities of the designated pest management team should be written in the IPM Plan.	ST
6.5 Inclusiveness	All common shipboard insects and rodents should be taken into consideration in the IPM Plan. These include, but are not limited to cockroaches, flies, mosquitoes, bedbugs, fleas, bees, mites, ants, beetles, pests of stored products, fruit flies and rodents.	ST
6.6 Monitoring	Passive and active surveillance, including surveillance at night, should be conducted for evidence of pests. All potential risk areas should be included (food preparation, storage and service areas, garbage rooms, cabins, technical spaces, open decks etc.).	ST

6.7 Inspections	For active surveillance periodical scheduled visual inspections should be conducted. During inspections, the following should be checked: • the presence of pests or other evidence such as droppings/faeces, cast skins or urine; • leaking water supplies and waste water drain lines, damp and wet areas; • harbourage and cover areas including warm spaces such as equipment/machine rooms; • access for points of entry and luggage/supplies; • unsanitary conditions and access to food and water; • areas with standing water (lifeboat covers, bilges, scuppers, awnings, gutters, air treatment plants etc.).	ST
6.8 Trap placement	• Passive surveillance should be conducted by placement of suitable traps, which should be checked and replaced according to a specific schedule.	ST
	• If active surveillance has revealed evidence of the presence of pests such as rodents, then further monitoring should be carried out.	ST
6.9 Control measures	When pests or evidence of pests (e.g. casts) are found, control measures should be applied. A follow up inspection should be conducted to ensure that the pests have been controlled.	ST
6.10 Record keeping	• Active and passive surveillance should be recorded, including the locations inspected, dates, time, the names of crew involved, any pests found and control measures applied.	ST
	• Records and training documents should be kept for 12 months and be available during inspections.	ST
6.11 Pesticides	A list of the pesticides carried on board should be maintained and be available during inspections.	ST
6.12 IPM Evaluation	The IPM Plan should be evaluated for effectiveness periodically. It should be revised whenever needed – for example when there is a significant change in the ship structure or after a significant refit. The evaluation should be undertaken more frequently where a pest infestation exists but cannot be controlled.	ST
6.13 Availability of IPM	The IPM Plan should be available during inspection.	ST
6.14 Supplies	Pesticides and traps (for insects and rodents) should be available on board and during inspection.	ST

Specific pest control preventive measures

6.15 Exclusion of pests	• All points where pests may enter the food preparation, service areas and cabins must be protected from the entry of pests. • Incoming food and supplies should be routinely inspected for evidence of pests.	RQ ST
6.16 Rat guards	Rat guards or other appropriate rodent prevention measures should be fitted when the ship is in port.	ST
6.17 Harbourage	Precautions should be taken to prevent harbourage in food areas as described in Chapter 3 of the manual (cleaning of all food preparation areas, hygienic waste management etc.).	ST
6.18 Cleaning	Traps and insect control devices should be cleaned or replaced at regular intervals, in order to maintain hygienic conditions.	ST

Pesticide application

6.19 Trained crew	Pesticides should be applied only by persons who are trained in the application methods and use of the pesticide being applied.	ST
6.20 Health and safety	Health and safety procedures should be implemented to protect the passengers and crew before and after the pesticide application.	ST
6.21 Storage and handling of pesticides	Pesticides should be stored and handled in accordance with the provisions described in Chapter 8 of the manual.	ST

Requirements of EU legislation and other conventions

International Health Regulations 2005, Article 24: Conveyance operators shall permanently keep conveyances for which they are responsible free of sources of infection or contamination, including vectors and reservoirs. The application of measures to control sources of infection or contamination may be required if evidence is found. Specific measures applicable to conveyances and conveyance operators with regard to vector-borne diseases are provided in Annex 5.

Regulation (EC) No 852/2004 on the hygiene of foodstuffs:

Food business operators are to take adequate measures, as far as possible to prevent animals and pests from causing contamination.

The layout, design, construction, siting and size of food premises are to: permit good food hygiene practices, including protection against contamination and, in particular, pest control. Adequate procedures are to be in place to control pests. Refuse stores are to be designed and managed in such a way as to enable them to be kept clean and, where necessary, free of animals and pests.

Directive 98/8/EC concerning the placing of biocidal products on the market

This Directive concerns: (a) the authorisation and the placing on the market for use of biocidal products within the MS; (b) the mutual recognition of authorisations within the Community; (c) the establishment at Community level of a positive list of active substances which may be used in biocidal products. *"Where biocidal products are used at work, use shall also be in accordance with the requirements of Directives for the protection of workers."*

7. HOUSEKEEPING AND FACILITIES

Housekeeping plays an important role in maintaining a ship in a condition that is not harmful to health and therefore contributes to public health protection. It is necessary that all accommodation spaces are maintained to a hygienic standard.

7.1 Accommodation and public spaces

Accommodation facilities for both passengers and crew, and public spaces such as corridors, lounges, bars and restaurants, should achieve hygienic standards in terms of design, construction and cleaning. Accommodation spaces should have suitable and sufficient means of natural or mechanical ventilation, and have adequate natural and/or artificial lighting. Cleaning and disinfection is a key component of housekeeping. An effective cleaning and disinfection protocol for all areas of the ship not only makes the ship more visibly appealing but, more importantly, reduces the risk of infection transmitted through environmental sources.

Requirements (RQ)/recommended standards (ST)

Item	Details	RQ/ST
	Construction and maintenance	
7.1.1 Maintenance	Accommodation and public spaces should be maintained in good repair.	ST
7.1.2 Materials and construction	• The construction of decks, deckheads and bulkheads in accommodation and public spaces should allow effective cleaning. Materials should be suitable to allow the type of cleaning appropriate to the area.	ST
	• Joints between decks and bulkheads should be constructed so as to avoid gaps and crevices.	ST
	Cleaning, disinfection and body fluid spillage policy	
7.1.3 Cleaning and disinfection of surfaces	Decks, bulkheads, deckheads, surfaces of furniture and other surfaces should be kept clean. Other surfaces include, but are not limited to door handles, hand rails, elevator buttons, telephones, keyboards and tabletops. High risk areas may require additional cleaning and disinfection.	ST
7.1.4 Carpeting and other deck coverings	• Carpeting and deck surfaces should be kept clean.	ST
	• During GI outbreaks vacuum cleaning of carpets and floors has the potential to recirculate pathogenic microorganisms and should	ST

not be performed when the infectious agent is suspected of being transmitted through environmental surfaces.

7.1.5 Cleaning Plan/Schedule

- A Cleaning Plan/Schedule should be in place in all accommodation and public spaces. ST
- A Cleaning Plan/Schedule should include: ST
  - areas, surfaces or items to be cleaned;
  - type of cleaning materials to be used;
  - method of cleaning and disinfection;
  - frequency of cleaning (before/after use, daily, weekly, monthly);
  - any safety precautions for crew.

7.1.6 Frequency

Decks, bulkheads, deckheads, surfaces or furniture should be cleaned throughout the day at a frequency to help reduce any risk of contamination. ST

7.1.7 Avoid cross contamination

Cleaning and disinfection should take place so as to avoid cross contamination. ST

7.1.8 Body fluid spillage policy

- A procedure for dealing with body fluid spillages (blood, vomiting and diarrhoea) should be in place. ST
- In the event of an incident such as body fluid spillage (e.g. faeces, vomit), appropriate disinfectants should be used. ST
- There should be trained crew who carry out the cleaning and disinfection of the area. ST
- The trained crew should use protective clothing (e.g. gloves and aprons), which should be disposable, where possible. ST
- The cleaning materials and disposable protective clothes should be placed in sealed bags which should be incinerated or carefully disposed off to avoid any contamination. Cleaning equipment should be decontaminated and non disposable clothing laundered. ST
- Given the risk of infection associated with body fluid, passengers and crew should not be allowed into an area where there has been a spillage until the area is cleaned. ST
- If linen is soiled with body fluids, it should be washed separately (see item 7.6.5). ST
- All soiled linen should be washed as soon as possible (see item 7.6.5). ST
- Damaged or heavily soiled linen which cannot be effectively laundered should be disposed of in a sealed bag and incinerated. ST

Uniform policy

7.1.9 Uniform policy

- All crew working in facilities on board (e.g. nurseries and play areas, hairdressers and beauty salons, gym) should maintain a high degree of personal cleanliness. ST
- Crew should wear suitable clean protective clothing (e.g. uniforms, aprons). ST
- Protective clothing or uniform should completely cover other clothing. ST
- Protective clothing or uniform should be changed regularly or as soon as they get dirty. ST

Ventilation

7.1.10 Ventilation

- All spaces should be well ventilated. ST
- There should be suitable and sufficient means of natural or mechanical ventilation to all accommodation spaces. ST
- Ventilation systems should be constructed so that filters and other parts requiring cleaning or replacement are readily accessible. ST
- Drains in air handling and conditioning systems should be regularly inspected in order to ensure that are properly working. ST
- Condensate trays and sumps should be kept clean and regularly disinfected. ST
- Filters of air conditioning systems should be kept clean. ST

7.1.11 Ventilation systems

The ventilation system for cabins should be controlled so as to: ST

- maintain the air in a satisfactory condition;
- ensure adequate air movement in all conditions of weather and climate.

7.1.12 Isolated air points

- Air intake points should be located away from air extraction points to allow for proper air circulation. ST
- Air intake and extraction points should be screened to prevent the entry of pests. ST

Lighting

7.1.13 Lighting

- Accommodation and public spaces should have adequate natural and/or artificial lighting. ST

7.1.14 Intensity of lighting in different spaces

- In high risk areas such as toilets and hand washing facilities, lighting levels should be increased so as to allow effective cleaning and the monitoring of cleaning standards. ST

Requirements of EU and international legislation and convention
IHR, Article 24, paragraph c:

Conveyance operators shall permanently keep conveyances for which they are responsible free of sources of infection or contamination. The application of measures to control sources of infection or contamination may be required if evidence is found.

ILO Maritime Labour Convention, 2006 (Regulation 3.1):

Each Member shall ensure that ships that fly its flag provide and maintain decent accommodation and recreational facilities for seafarers working or living on board, or both, consistent with promoting the seafarers' health and well-being.

Regulation (EC) No 852/2004 (Chapter I(5)) on the hygiene of foodstuffs:

There is to be suitable and sufficient means of natural or mechanical ventilation in food preparation areas. Mechanical airflow from contaminated area to a clean area is to be avoided. Ventilation systems are to be so constructed as to enable filters and other parts requiring cleaning or replacement to be readily accessible.

7.2 Toilets and hand washing facilities

Hand washing is an important hygiene practice for passengers and crew, reducing the likelihood of pathogenic contamination of food, water and environment and reducing the risk of disease transmission. Hand washing should take place after activities such as using the toilet, smoking, sneezing, coughing, and changing nappies.

Item	Details	RQ/ST
	Construction and maintenance	
7.2.1 Location	• Toilets should not open directly into spaces where food is prepared, stored or served. Where this is the case there should be a positive air flow from the food preparation areas.	ST
	• Wherever possible, there should be a ventilated space between the toilets and the food areas.	ST
7.2.2 Drainage	Decks in the toilet facilities should be designed to ensure that there is no accumulation of pooled water under normal operation conditions.	ST
7.2.3 Hand washing	Hand washing facilities should be provided within, or adjacent to, toilets.	ST
7.2.4 Equipment of hand washing facilities	Hand washing facilities should include hot and cold running water preferably from a single mixing outlet, single-service paper or cloth towel dispenser or drying device, suitable liquid soap or detergent and waste bin.	ST
7.2.5 Signs	Signs should be posted in the toilet/sanitary accommodation requesting that passengers wash their hands after using the toilet and crew wash their hands often. The hand washing method is given in Annex 14.	ST

7.2.6 General cleaning procedures	Surfaces such as toilet seats, flush handles or pulls, door handles should be cleaned and disinfected frequently throughout the day.	ST

7.3 Nursery and play areas

In general, the three most important ways of preventing the spread of infectious disease in nursery and play areas are: (1) effective hand washing, (2) exclusion of sick children and crew and (3) immunisation of children and crew. To promote and enable effective hand washing, sinks and other hand washing facilities need to be readily accessible and appropriately located.

Item	Details	RQ/ST
	Hand washing	
7.3.1 Hand washing facilities	• Hand washing facilities should be located within or close to the nursery and play areas. • Hand washing facilities should be positioned at an appropriate height for crew and children.	ST ST
7.3.2 Supervision of children's hand washing	Crew should supervise and observe children so that they wash their hands at appropriate times using the correct method. The method of hand washing is given in Annex 14.	ST
	Nappy (diaper) changing area	
7.3.3 Location of nappy changing area	• An area specifically set aside for changing nappies should be provided. • The nappy changing area should be located inside the nursery and play areas.	ST ST
7.3.4 Hand washing station	The nappy changing area should include a hand washing station.	ST
7.3.5 Nappy changing table	Nappy changing tables should be constructed of impervious, non-absorbent, non-toxic, smooth, durable and easily cleanable material.	ST
7.3.6 Equipment	The area should be equipped with cleaning wipes, soiled nappy bin, detergent and disinfectant. An emergency supply of disposable nappies is recommended.	ST
7.3.7 Signs	Signs should be posted in the nappy changing area requiring crew to wash their hands after each nappy change.	ST
7.3.8 Protective measures for	The nappy changing area (table or mat) should be thoroughly cleaned	ST

nappy changing

after each nappy change with detergent and warm water and disinfected if necessary.

Toilets

7.3.9 Separate toilet facilities

Separate toilet facilities should be provided for the children in the nursery and play area. ST

7.3.10 Signs in toilets

Signs should be posted in the toilets requiring crew to wash their hands and the children's hands after toilet use. ST

Cleaning and disinfection

7.3.11 General cleaning procedures

Surfaces that children touch should be cleaned and disinfected frequently throughout the day. Tables or high chair trays should be cleaned before and after they are used for eating. ST

7.3.12 Body fluid spillages

When body fluid spillages occur, proper cleaning procedures should be followed (refer to the ship's body fluid spillage policy). ST

Waste disposal

7.3.13 Waste disposal

Waste materials should be removed from nursery and play areas according to Chapter 9 - Waste management. ST

Toys

7.3.14 Materials of toys

Toys must be designed and manufactured in such a way as to meet hygiene and cleanliness requirements in order to avoid any risk of infection, sickness or contamination. RQ

7.3.15 Cleaning of toys

- Toys, especially those in rooms with younger children, should be cleaned at the end of each day. ST
- Toys which become dirty or which have been used by a child known to be ill should be immediately removed from the play area. Such toys should be cleaned/disinfected immediately if the toy is to be used again that day, or put aside for cleaning/disinfection at the end of the day. ST
- Toys should be washed in warm water and detergent, well rinsed and dried. ST
- Many toys can be cleaned in dish washers. Balls used in ball pits/pens should be cleaned at least once per week; if balls are known to have been contaminated they should be washed before they are used again. ST

Infection surveillance

7.3.16 Guidance on childhood infections	Written guidance on the symptoms of common childhood infectious illnesses should be provided for passengers and nursery and play area crew.	ST
7.3.17 Reporting of ill children	• Parents should be encouraged to tell crew working in these areas when any children are ill.	ST
	• Crew working in this area should be aware of the symptoms of common childhood infectious illnesses.	ST
	• If a child seems unwell, the child should be separated from other children and medical advice sought.	ST
	• Parents should be informed that the child needs to be picked up as soon as practicable.	ST
7.3.18 Exclusion policies	• Nursery and play areas should have an exclusion policy. Crew working in these areas should have knowledge of the policy.	ST
	• Medical advice should be sought from medical staff or other designated crew prior to exclusion from nursery and play areas.	ST
	• Advice should be sought prior to an excluded child re-entering the nursery or play area.	ST

Requirements of EU legislation
Directive 2009/48/EC on the safety of toys (Annex II(V)):

1. Toys must be designed and manufactured in such a way as to meet hygiene and cleanliness requirements in order to avoid any risk of infection, sickness or contamination.
2. A toy intended for use by children under 36 months must be designed and manufactured in such a way that it can be cleaned. A tectile toy shall, to this end, be washable, except if it contains a mechanism that may be damaged if soak washed. The toy shall fulfill the safety requirements also after having been cleaned in accordance with this point and the manufacturer's instructions.

7.4 Hairdressers, beauty salons and gyms

Hairdressing and cosmetic services are not considered high risk for transmission of any serious infections. However, some common infections have been associated with hairdresser/beauty salons, including bacterial infections such as impetigo and furuncles (boils), viral infections such as herpes simplex and verrucae (warts) and fungal infections such as tinea capitis and tinea corporis (ringworm infections). Infestations such as head lice are also common. Treatments such as depilatory waxes and lotions, as well as make-up and other lotions and gels can also act as sources for disease transmission if they are incorrectly handled. To prevent the spread of microbial infections or infestations of head lice, crew should maintain the premises and equipment in a hygienic condition, and undertake procedures in a safe and appropriate manner.

Crew in hairdressers, beauty salons and gyms should receive training according to their duties. Training should include issues such as the spread of pathogenic microorganisms, cross contamination, personal health and hygiene, hand washing and cleaning and disinfection techniques. The EU legislation requires that gym operators take care of the structural safety and adequate maintenance of gym equipment.

Item	Details	RQ/ST
	Hand washing	
7.4.1 Hand washing	The recommended hand washing method is set out in Annex 14.	ST
	Services	
7.4.2 Use of razors	New, single-use, disposable razor blades should be used for each customer.	ST
7.4.3 Use of cosmetics	• A new batch of depilatory waxes and lotions should be made for each customer.	ST
	• Make-up, lotions, waxes and gels should not be reused and should be administered with either a disposable, or clean and disinfected, applicator.	ST
	Treatment of wounds	
7.4.4 Wounds treatment	Minor wounds should be treated according to the company policy. In the case of more serious wounds, medical advice should be sought.	ST
	Cleaning and disinfection	
7.4.5 Cleaning of equipment	All items such as combs, brushes, scissors, clippers, manicuring and pedicure instruments and make-up equipment should be cleaned and disinfected or sterilised when necessary and between each customer.	ST
	Waste disposal	
7.4.6 Sharps disposal	Waste materials, including any sharps, should be removed from hairdresser and beauty salon areas according to Chapter 9 – Waste Management, section 9.5.	ST
	Gym	
7.4.7 Characteristics	• Gym equipment should be kept clean.	ST

of gym equipment	• Disposable disinfecting sprays, swabs/paper towels, or sanitary wipes/washable rags should be made available for use by customers.	ST

Requirements of EU legislation
Directive 98/37/EC (Annex I (1.1.3 and 1.1.5)) on the approximation of the laws of the Member States relating to machinery:

1. The materials used to construct machinery or products used and created during its use must not endanger exposed persons' safety on health.
2. Machinery or each component part thereof must:
   - be capable of being handled safely;
   - be packaged or designed so that it can be stored safely and without damage (e.g. adequate stability, special supports etc.).

7.5 Pet/animal housing areas

Where kennels for pets are provided they must be kept in a clean and hygienic condition. Crew should be trained according to their duties.

Item	Details	RQ/ST
	Construction	
7.5.1 Facilities designed to be cleanable	Animal housing areas should be constructed and equipped with materials that can be easily cleaned and disinfected. All decks, surfaces and fittings should be constructed of smooth, impervious, durable and preferably light coloured material.	ST
7.5.2 Air circulation	Kennels should be designed and constructed so as to provide animals with adequate space for effective air circulation.	ST
7.5.3 Deck design	Decks should be designed, constructed and maintained to minimise leakage of urine and faeces.	ST
	Cleaning and disinfection	
7.5.4 Faeces and soiled bedding	Faeces, urine, other body fluid and soiled bedding should be removed promptly.	ST
7.5.5 Cleaning of surfaces	All surfaces should be cleaned thoroughly to remove organic matter before disinfection.	ST
	Waste disposal	
7.5.6 Storage of waste	Animal waste should be managed as infectious medical waste	ST

(Chapter 9 – Waste management, section 9.5).

	Monitoring of infections	
7.5.7 Common infections	Written guidance on symptoms of common animal infectious illnesses should be provided for crew.	ST
7.5.8 Daily monitoring for illness	Animals should be monitored daily for signs of illness, and receive appropriate care by the owners.	ST
7.5.9 Isolation of infected animals	Animals suspected or known to be infected with a pathogen should be isolated from passengers and from other animals.	ST

7.6 Laundry

Soiled clothing and linen may be a source of contamination from pathogenic microorganisms, especially when they are from ill persons (e.g. cases of gastroenteritis). Transmission of skin infections can be prevented by thorough washing of linen and clothing. Washing of clothing and linen at appropriate water temperature with soap or detergent is an effective means of destroying and diluting microorganisms. Proper handling including transport and storage of linen and clothing is important during laundry procedures in order to avoid cross contamination and to protect crew.

Item	**Details**	**RQ/ST**
	Construction and maintenance	
7.6.1 Availability of laundry facilities	Appropriately situated and equipped laundry facilities should be available.	ST
7.6.2 Equipment of laundry facilities	The laundry facilities provided for use should include: • washing machines; • drying machines or adequately heated and ventilated drying rooms.	ST
7.6.3 Soiled linen	• All dirty linen should be bagged or placed in containers at the site of collection unless a laundry chute is used.	ST
	• During the transfer of laundry bags, there should be no risk of cross contamination en route.	ST
	• Water soluble bags should be used for instances when linen is soiled with body substances (e.g. faeces) to avoid cross contamination.	ST
	• All soiled linen should be washed as promptly as possible.	ST

- If linen is soiled with body substances (e.g. faeces), it should be washed separately, with a pre-wash sluice cycle. ST
- Heavily soiled linen should be disposed of as infectious medical waste in a sealed bag. ST

7.6.4 Linen from cases of communicable diseases transmitted through contaminated linen

- Laundry from persons who are suffering from gastroenteritis or any other communicable disease which can be transmitted through contaminated linen should be stored, transported and processed separately from all other laundry. ST
- These laundry items should be placed separately in water soluble bags before transfer to the laundry. ST
- Crew should wear PPE, such as gloves and apron, when dealing with laundry from persons with a communicable disease that can be transmitted through contaminated linen. ST

7.6.5 Washing of linen

- Linen should be washed in a temperature of 60°C (140°F). ST
- When the linen are from persons who are suffering from gastroenteritis or any another illness transmissible through contaminated linen: ST
  - the linen should be laundered at a high temperature of more than 75°C (167°F), and preferably at 90°C (194°F), or
  - washed using disinfecting chemicals as per the manufacturer's/supplier's instructions.

7.6.6 Linen carts

- Separate linen trolleys/carts should be used for soiled and clean linen. ST
- Trolleys/carts used to transport soiled linen should be cleaned and disinfected after each use. ST

8. HAZARDOUS SUBSTANCES

Hazardous substances are used on board ships during operations such as dry cleaning, photo processing, printing, housekeeping and maintenance. Chemical agents used in a food operation area can be categorised into three basic categories: a) maintenance, b) cleaning and disinfection and c) pest control chemicals. Appropriate handling of hazardous substances that are used on board can prevent potential health risks. The high risk posed to both human health and the environment has lead the EU to set a strict legislative framework setting requirements regarding the labelling, storage, safe handling and disposal of hazardous substances.

Requirements (RQ)/recommended standards (ST)

Item	Details	RQ/ST
	Management	
8.1 Risk assessment	Hazardous chemical agents used in the accommodation/public spaces must be identified and their risk must be assessed (Annex 22).	RQ
8.2 Biocidal products	Biocidal products used on board the ship must comply with the requirements listed in Directive 98/8/EC.	RQ
	Labelling	
8.3 Original containers labelling	• All hazardous substances in their original containers must carry a legible manufacturer's label. • The labels must be written in a language that the crew can read and understand.	RQ RQ
8.4 Working containers	Working containers of hazardous substances, when filled from bulk containers, must be clearly identifiable. The manufacturer's name and the relevant safety and environmental details listed on the manufacturer's label must be incorporated.	RQ
8.5 Unlabelled containers	Unlabelled hazardous chemical containers must never be used in food areas.	RQ
	Packaging	
8.6 Packaging design and material	Packaging containing hazardous substances or mixtures must be easily identifiable and must comply with the following requirements:	RQ

- the packaging must be designed and constructed so that the contents cannot escape, except in cases where other more specific safety devices are prescribed;
- the materials constituting the packaging and fastenings must not be susceptible to damage, or liable to produce hazardous compounds when in contact with the contents.

Storage

8.7 Storage areas

All storage areas for hazardous substances should be clearly labelled to indicate the types of materials stored within. These areas should be locked when not in use to prevent unauthorised access that might initiate spills or leaks that could contaminate food, packaging materials, utensils or equipment. ST

8.8 Chemical agents

Cleaning and disinfection chemical agents should not be stored in food preparation areas. If stored near to food preparation or serving areas the chemical agents should be suitably secured to prevent contamination. ST

8.9 Containers

Containers previously used to store hazardous substances should not be used to store or transport food. ST

Material Safety Data Sheets

8.10 Material Safety Data Sheets

The designated crew member must ensure that the Material Safety Data Sheet is obtained by the supplier before the hazardous substance is first supplied to the workplace. RQ

Application

8.11 Handling and disposal

Hazardous substances must be handled and disposed of in accordance with procedures which take into consideration how the substance is used, how it is chemically altered during use, requirements specific to the vessel, and the information contained on the Material Safety Data Sheets. RQ

8.12 Training

Appropriate training and information should be given to those crew exposed to hazardous substances in relation to health hazards and safe use and handling of hazardous substances. ST

8.13 Hand washing station

A hand washing station should be located at the place where working containers are filled from bulk containers of hazardous substances, or solution preparation is taking place. The hand ST

washing station should be supplied as described in section 7.2.

8.14 PPE

Appropriate PPE must be provided to and used by the handlers of hazardous substances, in accordance with the ships health and safety policy and as per the Material Safety Data Sheet instructions. RQ

Requirements of EU legislation

Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006

Regulation (EC) 1272/2008 laying down EU-wide criteria that must be applied to determine whether a substance or mixture which is manufactured or imported into the European market has properties which could damage human health or the environment. In cases where the substance or mixture meets these so-called "classification criteria", i.e. if it has certain hazardous properties, the substance or mixture must be classified accordingly, e.g. for acute toxicity or for flammability. Suppliers must then communicate the identified hazards of these substances or mixtures to their customers, including to consumers.

Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency.

According to the above regulation the safety data sheets are used as the main communication tool within the supply chain of substances and suppliers must provide the recipient of the substance or preparation with a Safety Data Sheet. The Safety Data Sheets will enable users to take the necessary measures relating to protection of human health and safety at the workplace, and protection of the environment.

Regulation (EC) No 852/2004 on the hygiene of food stuffs

Hazardous and/or inedible substances, including animal feed, are to be adequately labelled and stored in separate and secure containers.

Adequate arrangements and/or facilities for the hygienic storage and disposal of hazardous and/or inedible substances and waste (whether liquid or solid) are to be available;

Directive 98/8/EC concerning the placing of biocidal products on the market

This Directive concerns: (a) the authorisation and the placing on the market for use of biocidal products within the MS; (b) the mutual recognition of authorisations within the Community; (c) the establishment at Community level of a positive list of active substances which may be used in biocidal products. *"Where biocidal products are used at work, use shall also be in accordance with the requirements of Directives for the protection of workers."*

Directive 89/656/EEC on the minimum health and safety requirements for the use by workers of personal protective equipment at the workplace.

Personal protective equipment shall be used when the risks cannot be avoided or sufficiently limited by technical means of collective protection or by measures, methods or procedures of work organization.

Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work.

This directive lays down minimum requirements for the protection of workers from risks to their safety and health arising, or likely to arise, from the effects of chemical agents that are present at the workplace or as a result of any work activity involving chemical agents.

9. WASTE MANAGEMENT

The daily operations on board ships generate significant amounts of waste. Appropriate control and effective management are needed in order to avoid health and environmental risks. The waste streams from ships include food waste, garbage, sewage and grey water, hazardous waste and infectious and non-infectious medical waste. These types of wastes, if not properly treated and disposed of, can be a significant source of pathogens with the potential to threaten human health. Adopting control measures such as appropriate storage of waste and safe handling procedures will help to safeguard public health on board ships. In response to the particular concerns arising from the impacts of ships discharges, a strict international legislative regime was developed by the IMO with the International Convention for the Prevention of Pollution from Ships (MARPOL). The EU has enacted legislative requirements for the control, safe handling, storage and disposal of waste.

9.1 All types of wastes

Requirements (RQ)/recommended standards (ST)

Item	Details	RQ/ST
	General requirements/recommended standards	
9.1.1 Written procedures	Written procedures should be in place for the storage, handling, and discharge of sewage and grey waters and for the disposal of garbage, hazardous and medical waste. These procedures should outline waste control measures and corrective actions in emergency situations (in case of accidental discharge, spillage or cross contamination).	ST
9.1.2 Records	The following records should be available during inspection:	
	• Garbage Management Plan;	ST
	• Garbage Record Book, where each discharge operation or completed incineration and any accidental loss should be reported;	ST
	• International Sewage Pollution Prevention Certificate (valid for 5 years maximum);	ST
	• the Waste Declaration Document must be kept on board at least until the next port of call and must, upon request, be made available to the competent authority.	RQ
	Voluntary IMO forms : – Standard format of the advance notification form for waste delivery to port reception facilities (MEPC.1/Circ.644) (in place of the waste Declaration Document as per Directive 2007/71/EC). – Waste Delivery Receipt (MEPC.1/Circ.645).	
9.1.3 Separate	• Separate receptacles or containers must be used for the segregation	RQ

containers	of food waste, animal by-products, hazardous waste, medical waste and recyclables. • They should be clearly labelled and distinguishable by colour, graphics, shape, size and/or location.	ST
9.1.4 Knowledge of crew	Crew should have knowledge of the health risks involved with waste accumulation and spoilage, and of the correct use of PPE.	ST
9.1.5 PPE	• Appropriate PPE must be used when collecting, transferring and handling waste to mitigate the risks present. • The following should be made available to all crew who collect or handle waste: o helmets, with or without visors – depending on the operation; o face masks – depending on operation; o eye protectors (safety goggles) – depending on operation; o overalls (coveralls); o leg protectors and/or industrial boots; o disposable gloves or heavy-duty gloves (waste workers).	RQ ST
9.1.6 Disposal of waste/notification procedures	Discharge of all types of waste must be in accordance with MARPOL (restricted discharge in ports, and protected areas). Delivery of waste to port reception facilities must be carried out in accordance with the Directive 2000/59/EC.	RQ

Directive 2000/59/EC
The master of a ship calling at a Community port, before leaving the port, must deliver all waste to a port reception facility. A ship may proceed to the next port of call without delivering the ship-generated waste, if the designated crew can demonstrate that there is sufficient dedicated storage capacity for all ship-generated waste that has already been and will be accumulated during the intended voyage of the ship until the port of delivery.

9.2 Garbage

Item	**Details**	**RQ/ST**
	Receptacles and containers	
9.2.1 Hygienic Waste Management	Garbage must be collected, handled and disposed in a hygienic manner and at a frequency so that garbage does not accumulate, except in designated garbage storage areas.	RQ
9.2.2 Capacity of receptacles	There must be an adequate number of receptacles or containers for food waste, animal by-products and recyclables in every area of the	RQ

ship where garbage is expected to be generated or discarded.

9.2.3 Tightly covered receptacles

Food waste must be deposited in tightly covered receptacles, or in closed compartments, unless ship food operators can demonstrate to the competent authority that other types of containers or evacuation systems used are appropriate. RQ

9.2.4 Receptacle construction specifications

Garbage receptacles or containers must be of an appropriate material and design, be kept in sound condition, be non-absorbent, durable, leak-proof, be easy to clean and, where necessary, to disinfect. They must not attract pests. RQ

9.2.5 Cleaning procedures

Soiled food waste bins and recyclables receptacles should be cleaned (when empty) in specific areas designated only for this purpose away from food areas. These areas should have access to water, detergent, and suitable drainage. ST

Garbage handling in galleys

9.2.6 Avoiding contamination

Garbage must not be a direct or indirect source of contamination (e.g. through contact with surfaces that food is prepared on, or by attracting pests). RQ

9.2.7 Garbage accumulation

Garbage must not be allowed to accumulate in food preparation or serving areas beyond the end of any work shift, so as to avoid contamination of food or the creation of conditions favourable for pest infestations. RQ

9.2.8 Transportation

- Interiors of garbage lifts, garbage chutes, sorting tables or any other surfaces in the galley coming into contact with garbage should be made of easily cleanable, corrosion-resistant, non-absorbent and durable materials. ST
- Drains should be installed at the bottom of all garbage lift shafts including provision platform lifts and dumbwaiters. ST

Garbage waste storage room

9.2.9 Garbage room

Garbage waste, animal by-product bins and recyclables receptacles should be stored in a designated garbage storage room separate from food handling operations. ST

9.2.10 Garbage room size

Each ship must have a garbage storage space of adequate size to accommodate the maximum quantity of waste produced between the most distant unloading periods, or when unloading is prohibited. RQ

9.2.11 Garbage room specification	The garbage room should: • be constructed and maintained so as to be pest-proof; • be easily cleaned and disinfected; • be ventilated and illuminated; • have a constructed system which will prevent pooling of water; • be maintained at appropriate cleaning status so that odours produced are minimised as much as possible; • have a refrigerated space for the storage of wet garbage; • have a hand washing station with potable hot and cold water, a hose connection and a deck drain; • have restricted access for non-authorised crew.	ST
9.2.12 Cleaning procedures	Schedules and procedures for cleaning and disinfection should be established for the garbage room and the equipment used.	ST
	Garbage waste treatment and disposal	
9.2.13 Garbage waste treatment	• Food refuse grinders or disposal units located in sculleries or other food handling area should be operated with potable water only. • Processes and techniques to compact, or to comminute garbage should be adopted.	ST ST
9.2.14 Animal by-product disposal	Animal by-products must be disposed of to the port reception facilities for incineration or disposal to approved landfill sites.	RQ

9.3 Sewage and grey water

Item	Details	RQ/ST
	Drain lines	
9.3.1 Distinguishing drain lines	• Separate, leak-proof, isolated drainage systems must exist for sewage and grey water. • Drainage system shoud operate effectively and overflowing toilets or shower stalls in passenger and crew cabins should not exist. • Drain lines carrying sewage and grey water should be easily distinguishable by labelling or other signs e.g. coloured stripes on all waste system components (black colour for waste media according to ISO 14726).	RQ ST ST
9.3.2 Passage of drain lines carrying sewage	Drain lines carrying sewage and grey water should not be allowed to pass through ice machines, ice storage bins, or potable water tanks, or	ST

directly over:

- food preparation areas;
- food serving areas;
- food storage areas;
- bars, galleys or buffets;
- wash areas for food equipment or utensils;
- cabins;
- potable water treatment equipment.

9.3.3 Backflow prevention

Drains from sinks, dish washing machines and ice machines should not be directly piped to the ship's wastewater system but drain through an air-break to a drain or scupper. ST

Holding tanks and treatment system

9.3.4 Ventilation

Ventilation of sewage-holding tanks should be adequate and emissions should be driven outside of the ship and away from any air intakes. ST

Discharge of sewage and grey water

9.3.5 Overflow

Sewage and grey water should not be routinely overflowing into the bilge. ST

9.3.6 Discharge

No discharge of any type of sewage, sewage residuals or grey water must be allowed within an area from which water for a water supply is drawn or in any area restricted for the discharge of waste by any national or local authority. RQ

9.3.7 Hose and connections

- For discharge to port reception facilities, a dedicated hose and connections large enough to allow rapid discharge of waste should be used. This hose should be durable, impervious, and of a smooth interior surface. ST
- All waste hoses should be provided by the port reception facility. ST
- If the hose is supplied by the vessel: ST
  - it should be labelled FOR WASTE DISCHARGE ONLY;
  - after use and if the hose is stored on board, it should be thoroughly flushed with clean water, and stored in a convenient place, labelled WASTE DISCHARGE HOSE.

- Discharge lines must be fitted with a standard discharge connection in accordance with IMO MARPOL Annex IV Regulation 10 and must be capable of being capped or blanked. Addition of an end cap or blank to both hose ends when stored may be substituted for flushing. RQ

9.3.8 Cleanable Surfaces/ Disinfection

- Areas subject to routine splashes or spillages of waste should have cleanable features. ST
- Areas should be thoroughly cleaned and disinfected after splashing from sewage and grey water. ST

9.4 Hazardous waste

Item	Details	RQ/ST

Hazardous waste storage and handling

9.4.1 Storage

- Hazardous waste should be stored in a designated locked area. The storage room should be sufficient, clean and well ventilated. ST
- Hazardous chemical waste of different composition should be stored separately if they could cause unwanted chemical reactions. ST

Source/types of hazardous waste

1. Dry cleaning (spent solvent that is chlorinated solvent)
2. Photo processing waste (spent fixer, spent cartridges, expired film, silver flake)
3. Print shop waste (printing solvents, inks)
4. Photocopying and laser printer cartridges (spent or discarded cartridges, inks and toner material)
5. Used cleaners, solvents, paints, thinners
6. Incinerator ash
7. Fluorescent/mercury vapour bulbs
8. Batteries
9. Used and expired explosives
10. Discarded chemicals (solid, liquid or gaseous) that are generated during disinfecting procedures or cleaning processes.

Hazardous waste disposal

9.4.2 Hazardous waste disposal

- Hazardous waste (both solid and liquid) must be disposed of to approved contracted firms or agencies specifically authorised to manage hazardous waste according to national legislation. Where the port or other agent selects the waste contractor and not the ship, this standard applies to the port or other agent making that selection. RQ

	• If the ship has to arrange disposal of extra waste that cannot be accommodated by port reception facilities, discharge should be done through an approved hazardous waste contractor.	ST
9.4.3 Record keeping	Records should be kept regarding the ports where offloading of hazardous waste takes place.	ST

9.5 Medical waste

Item	Details	RQ/ST
	Medical waste storage and handling	
9.5.1 Knowledge of crew	Medical waste should be handled by crew with proper training.	ST
9.5.2 Medical Waste Storage	• A specific storage location for medical waste must be designated.	RQ
	• This area should be located inside the medical facilities or the garbage room.	ST
	○ Unless a refrigerated storage room is available, storage times for medical waste (i.e. the delay between waste production and treatment) should be limited as far as possible*.	ST

Recommended colour-coding scheme (§ 7.1 WHO 1999)

Type of Waste	Colour of container and marking	Type of container
Highly infectious waste	Yellow, marked "HIGHLY INFECTIOUS"	Strong, leak-proof plastic bag, or container capable of being autoclaved
Other infectious waste, pathological and anatomical waste	Yellow	Leak-proof plastic bag or container
Sharps	Yellow, marked "SHARPS"	Puncture-proof container
Chemical and pharmaceutical waste	Brown	Plastic bag or container
General health care waste	Black	Plastic bag

9.5.3 Infectious waste handling	Infectious waste must be handled with care and PPE must be used.	RQ
9.5.4 Infectious waste storage	• Infectious waste must be stored in a clearly marked space	RQ

* It is recommended for temperate climate: 72 hours in winter or 48 hours in summer and warm climate: 48 hours during the cool season or 24 hours during the hot season.

identified for this purpose only, or disinfected (e.g. by steam).

- Bags and containers for infectious waste must be marked with the international infectious substances symbol (see picture below). RQ

International infectious substances symbol

Infectious waste
Infectious waste is suspected to contain pathogens (bacteria, viruses, parasites, or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts. This category includes:

- cultures and stocks of infectious agents from laboratory work;
- waste from surgery and autopsies on patients with infectious diseases (e.g. tissues, and materials or equipment that have been in contact with blood or other body fluids);
- waste from infected patients in isolation wards (e.g. excreta, dressings from infected or surgical wounds, clothes heavily soiled with human blood or other body fluids);
- waste that has been in contact with infected patients undergoing haemodialysis (e.g. dialysis equipment such as tubing and filters, disposable towels, gowns, aprons, gloves, and laboratory coats);
- infected animals from laboratories;
- any other instruments or materials that have been in contact with infected persons or animals

(WHO, 1999, Safe management of wastes from health care activities).

9.5.5 Sharps storage and handling

- Used or opened sharps must all be collected together regardless of whether or not they are contaminated. RQ
- Sharps must be collected in UN certified plastic autoclavable sharps containers and retained on board for final disposal ashore. RQ
- Containers must be puncture-proof with tight fitting covers. RQ
- Containers must be equipped with an interim (if applicable) and a permanent closure feature. RQ

9.5.6 Pharmaceutical and chemical waste

Chemical and pharmaceutical waste must be segregated to be incinerated on board or ashore. RQ

Medical waste disposal

9.5.7 Infectious waste disposal

- When infectious medical waste is incinerated, it must be placed straight in the furnace, without first being mixed with other categories of waste and without direct handling. RQ
- If infectious waste has been disinfected, it can join the garbage collection and disposal mechanism. ST

9.5.8 Sharps disposal	Sharps (unused, contaminated or opened) should be disposed of ashore or incinerated as infectious medical waste.	ST
9.5.9 Liquid medical waste disposal	Liquid medical waste, with the exception of chemical and pharmaceutical waste or any waste that can affect the operation of the sewage system, may be disposed of by discharging them into the sewage system.	RQ
9.5.10 Non-infectious, non-hazardous	Non-infectious, non-hazardous waste can be handled and stored as garbage not requiring steam disinfection or special handling.	ST

Requirements of the EU legislation and International conventions

Regulation (EC) No 852/2004 on the hygiene of food stuffs

This Regulation seeks to ensure the hygiene of foodstuffs at all stages of the production process, from primary production up to and including sale to the final consumer. In addition, it sets requirement for the handling, storage and disposal of food waste.

Directive 2006/12/EC on waste

The measures outlined in this Directive apply to all substances or objects which the holder disposes of or is obliged to dispose of pursuant to the national provisions in force in the MS. MS shall take the necessary measures to ensure that the waste is recovered or disposed of without endangering human health and without using processes or methods which could harm the environment. Ships travelling within European waters must manage their wastes in compliance with national regulations and in essence with the above Directive.

Directive 2000/59/EC on port reception facilities for ship generated waste* and cargo residues. (Amendments: Directive 2007/71/EC amending Annex II)**

The purpose of this Directive is to reduce the discharges of ship-generated waste and cargo residues into the sea, especially illegal discharges, from ships using ports in the Community, by improving the availability and use of port reception facilities for ship-generated waste and cargo residues, thereby enhancing the protection of the marine environment. According to Article 6 and 7, the master of a ship is obliged to notify the type and quantity of waste and deliver all ship generated waste to the port reception facility.

**"ship-generated waste" shall mean all waste, including sewage, and residues other than cargo residues, which are generated during the service of a ship and fall under the scope of Annexes I, IV and V to Marpol 73/78 and cargo-associated waste as defined in the Guidelines for the implementation of Annex V to Marpol 73/78;*

***"cargo residues" shall mean the remnants of any cargo material on board in cargo holds or tanks which remain after unloading procedures and cleaning operations are completed and shall include loading/unloading excesses and spillage;*

Regulation (EC) No 1774/2002 laying down health rules concerning animal by-products not intended for human consumption

This Regulation lays down the health and surveillance rules applicable to: (a) the collection, transport, storage, handling, processing and use or disposal of animal by-products; (b) the placing on the market and, in certain specific cases, the export and transit of animal by-products and products derived there from.

Directive 2000/76/EC on the incineration of waste

Incineration of both hazardous and harmless wastes may cause emissions of substances which pollute the air, water and soil and have harmful effects on human health. This Directive sets requirements for the incineration of wastes, the air emissions, discharges of effluents and incineration residues.

Article 6 (7): *"Infectious clinical waste should be placed straight in the furnace, without first being mixed with other categories of waste and without direct handling."*

The International Convention for the Prevention of Pollution from Ships MARPOL.

Annex IV of MARPOL contains a set of regulations regarding the discharge of sewage into the sea, ships' equipment and systems for the control of sewage discharge, the provision of facilities at ports and terminals for the reception of sewage, and requirements for survey and certification.

Annex V of the MARPOL sets requirements for the disposal of garbage, including food waste (currently under review).

Annex VI: Regulations for Prevention of Air Pollution of MARPOL contains a set of requirements for the control of emissions from ships. Regulation 16 lists the requirements regarding shipboard incineration.

Directive 91/689/EEC on hazardous waste (Amendments: Directive 2008/98/EEC amending waste classified as hazardous waste featuring on the list established by Decision 2000/532/EC)

According to **Article 2**, hazardous wastes have to be recorded and identified. Different categories of hazardous waste or hazardous waste with non-hazardous waste must not be mixed.

According to **Article 5,** in the course of collection, transport and temporary storage, waste must properly be packaged and labelled in accordance with the international and Community standards in force.

10. BALLAST WATER MANAGEMENT

Ballast water and hull fouling are primary means for transporting aquatic species between ports. Many species of bacteria, plants, and animals can survive in a viable form in the ballast water and sediment carried in ships, even after journeys of several months duration. Organisms transported in ballast water and sediments in ballast tanks are a potential threat to human health. Subsequent discharge of ballast water or sediment into the waters of port States may result in the establishment of harmful aquatic organisms thereby posing threats to indigenous human, animal and plant life, and the marine environment.

Requirements (RQ)/recommended standards (ST)*

Item	Details	RQ/ST
	Management	
10.1 Ballast Water Management Plan and Ballast Water Record Book	The following records should be available during inspection: • Ballast Water Management Plan; • Construction drawings; • Ballast Water Record Book (to be maintained on board for a minimum of two years after the last entry has been made and thereafter in the company's control for a minimum of three years); • International Ballast Water Management Certificate (applicable after the Convention enters into force); • Ballast Water Reporting Form(s); • Type Approval Certificate of Ballast Water Treatment Systems.	ST
	Discharge	
10.2 Discharge valve	Ballast tanks should have valves set in "off" position to avoid the risk of accidental discharge, unless a risk assessment has been carried out and discharge has been authorised previously by competent authorities, according to the provisions of the IHR and the International Convention on the Control and Management of Ships' Ballast Water and Sediments.	ST
10.3 Sediment disposal	Sediments from spaces designated to carry ballast water should be removed and disposed in accordance with the Ballast Water	ST

* The Ballast Water Management Convention has not yet entered into force and is implemented on a voluntary basis. The Convention will enter into force 12 monts after ratification by 30 States, representing 35 per cent of world merchant shipping tonnage. As of July 2011, 28 States have ratified the Convention, representing 25.43% of world merchant shipping tonnage.

Management Plan.

Requirements of EU legislation and International conventions

International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (the "Ballast Water Management Convention")

Ships are required to have on board and implement a **Ballast Water Management Plan** approved by the Administration (Regulation B-1).

Ships must have a **Ballast Water Record Book** (Regulation B-2) to record when ballast water is taken on board; circulated or treated for Ballast Water Management purposes; and discarded into the sea.

Note: the Ballast Water Management Convention has not yet entered into force. The Convention will enter into force 12 months after ratification by 30 States, representing 35 per cent of world merchant shipping tonnage. As of July 2011, 28 States have ratified the Convention, representing 25.43% of world merchant shipping tonnage.

United Nations Convention on the Law of the Sea 1982 (UNCLOS)

Article 196 (1) Requires signatory nations to "take all measures necessary to prevent, reduce and control the international or accidental introduction of the species, alien or new, to any part of the marine environment which may cause significant or harmful changes thereto".

The Rio Declaration on Environment and Development and Agenda 21: Programme of Action for Sustainable Development, 1992 United Nations Conference on Environment and Development

Section 17.30: States, acting individually, bilaterally, regionally or multilaterally and within the framework of IMO and other relevant international organizations, whether subregional, regional or global, as appropriate, should assess the need for additional measures to address degradation of the marine environment:

a. From shipping, by:

vi. Considering the adoption of appropriate rules on ballast water discharge to prevent the spread of non-indigenous organisms;

Water Framework Directive (2000/60/EC) requires MS to achieve good ecological status in relevant waters.

Marine Strategy Framework Directive (2008/56/EC)

MS shall, in respect of each marine region or sub-region concerned, identify the measures which need to be taken in order to achieve or maintain good environmental status, as determined pursuant to Article 9(1), in their marine waters.

ANNEX I

Qualitative descriptors for determining good environmental status (referred to in Articles 3(5), 9(1), 9(3) and 24)

(1) Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.

(2) Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems.

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PART B

Guidelines for managing cases of communicable diseases on board passenger ships

Guideline I: Prevention and control of influenza-like illness on passenger ships

Guideline II: Prevention and control of gastroenteritis on passenger ships

Guideline III: Prevention and control of legionellosis on passenger ships

Guideline I

Prevention and control of influenza-like illness on passenger ships

Purpose

- To reduce the incidence of ILI on board passenger ships.
- To give information to ships in order to properly manage cases of ILI on board passenger ships.
- To give general guidance for pandemic influenza preparedness.

Overview

Respiratory illnesses, including the common cold and influenza, are some of the most common infections affecting human beings (Eccles, 2005). Influenza is an important illness that can pass between people and cause seasonal increases, outbreaks and pandemics. Respiratory tract infections have been diagnosed on ships (Schlaich et al., 2009; Dahl, 1999; Peake et al., 1999).

This document is intended for the medical staff on ships, but also describes the role of competent authorities at ports.

Annex 23 presents background information for influenza including virus characteristics, modes of transmission, epidemiological data and information regarding the situation in Europe. The first part of these guidelines describes preventive and control measures that can be applied on board passenger ships when cases of ILI occur. It also describes case definitions for reporting of seasonal influenza according to the EU legislation, as well as guidelines for recognising ILI outbreaks on board ships. The second part describes general guidelines for pandemic influenza. These guidelines are consistent with the IHR and the EU legislation and were prepared in collaboration with the ECC and the CLIA.

A. Guidelines for the prevention and control of seasonal influenza on passenger ships

1 Pre-embarkation

Vaccination

Vaccination of crew and passengers is an effective way of preventing influenza outbreaks. A voluntary vaccination programme against seasonal influenza is recommended for crew members. Shipping companies should vaccinate crew at risk of complications of influenza (Anon., 1997). A routine annual programme of vaccination against seasonal influenza may be considered (International Maritime Health Association, 2009; World Health Organization, 2009; Miller et al., 2000), with the aim of vaccinating at least 75% of the crew of each ship (European Commission of the European Communities, 2009). It is recommended at least 50% of crew within each department of each ship are vaccinated and this is especially relevant on large ships (European Council, 2009). Records of crew who have received vaccination, including names and dates, should be kept in order to help in decision making regarding public health measures during a potential outbreak situation. A cost-effectiveness analysis for vaccination of crews on cruise ships has shown that it is not only cost-effective but it is cost saving (Ruben and Ehreth, 2002).

Although companies have no responsibility to inform their customers about vaccination of influenza, passengers in at risk groups* should be advised by family doctors to be vaccinated (Brotherton et al., 2003; Centers for Disease Control and Prevention, 2001; Ferson et al., 2000; Miller et al., 2000) at least two weeks before the voyage, in order to develop immunity before boarding the ship. In this respect, passengers should seek the advice of family doctors or travel medicine practitioners. Travel companies and travel agencies should advise travellers to seek health information from a medical professional prior to their cruise.

It should be noted that as well as vaccination, other public health measures are also needed, since the vaccine given to passengers or crew may not be effective against the virus strain circulating on board (Brotherton et al., 2003; Anon., 1988).

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* (1) Older age groups, usually 65 years and older; and
(2) People with chronic medical conditions, particularly diseases of the following categories:
- chronic respiratory diseases;
- chronic cardiovascular diseases;
- chronic metabolic disorders;
- chronic renal and hepatic diseases;
- persons with deficient immunity (congenital or acquired);
- young people taking long-term salicylate therapy; and
- persons with conditions, which compromise respiratory function.

(European Council, 2009)

Options for action to minimise the introduction of the disease onto the ship

There are several methods of reducing the number of ill passengers and crew boarding passenger ships. Travel companies and travel agencies can provide pre-travel information to customers about health issues with their travel package. In this context, information regarding ILI symptoms and the importance of preventive measures such as delaying travelling, may be provided before the voyage. Information about the importance of not working while ill should be provided for all crew.

Dissemination of a health questionnaire at embarkation is another option to identify ill passengers or crew. If the company decides to implement such a measure then before boarding a ship all persons (passengers, crew and visitors) may be asked to complete and sign a written health questionnaire which is designed to screen for the symptoms of influenza. Annex 24 presents sample questionnaires prepared by the CLIA and the ECC. Passengers, visitors or crew who have symptoms of ILI or have noted "Yes" to questions about influenza symptoms on a health questionnaire should undergo assessment, if possible by medical staff and preferably at a private place at the terminal. If they agree to remain isolated in a cabin, they may be allowed to board the ship, but this decision rests with the passenger shipping company. If they are in an at risk group for complications, then they may be advised that it would be better to avoid travelling.

Crew who are present in terminals may observe all passengers and crew boarding the ship for symptoms of ILI. This can help identify passengers and crew who have symptoms suggestive of ILI.

The epidemiological situation, the activity of influenza virus and the characteristics (pathogenicity, virulence etc.) of seasonal influenza at each time, should be considered when deciding which pre-embarkation prevention measures to apply.

2 During the voyage

Education and communication

Education and increased awareness of ILI and influenza are important for all crew and passengers (Cruise Lines International Association, 2009; International Maritime Health Association, 2009; World Health Organization, 2009; Uyeki et al., 2003; Centres for Diseases Control and Prevention, 1999a).

Medical staff should be trained regularly about clinical characteristics, diagnosis and treatment, preventive measures, surveillance and reporting requirements of ILI and influenza (Centers for Diseases Control and Prevention, 1999).

Crew should be educated regularly about ILI, to:

- recognise the signs, symptoms and modes of transmission (e.g. hand to mucous membrane transmission);
- understand the measures that prevent the spread: hand washing, coughing and sneezing etiquette, social distancing, waste disposal, wearing masks, elimination of hand shaking events;

- recognise and report people with symptoms to designated crew.

Crew that come into contact with ill persons should be educated to properly use PPE (masks and gloves).

During normal conditions (non-outbreak situation), leaflets should be disseminated to passengers and crew who have developed symptoms of ILI, and their close contacts* (e.g. cabin mates). Example of two leaflets prepared for pandemic (H1N1) 2009 influenza virus are presented in Annex 25.

The leaflet should include information about:

- symptoms;
- hygiene rules (hand washing, coughing and sneezing etiquette, disposal of dirty tissues, social distancing, elimination of hand shaking events etc.);
- special considerations for high risk groups;
- what to do in case of relevant symptoms;
- the potential for an ILI outbreak on board (Brotherton et al., 2003).

During an outbreak, all passengers should be educated about ILI including information on all issues listed above, any preventive measures being implemented and the progress of the outbreak. This may be achieved by distributing leaflets as described above or by organising group counselling sessions (Centers for Diseases Control and Prevention, 1999).

Supplies and equipment

Adequate medical supplies and equipment should be available on board to respond to an outbreak (Schlaich, 2009). The following list presents the WHO (2007) recommended medicines and equipment by the International Medical Guide for Ships 3rd edition as well as those policies further recommended by the specific WHO guidance for H1N1 on ships.

WHO List of recommended Medicines and Equipment by the International Medical Guide for Ships 3rd edition 2007 (World Health Organization 2007)

- Antibiotics (to treat secondary pneumonia)
- Antipyretics
- Thermometers
- Intravenous fluids

* "***Close contact***" A close contact in a ship is considered to be a passenger or crew member who had been in close proximity and in such association with an infected person or enclosed environment for a prolonged period of time to have had opportunity to acquire the infection, such as, sharing a cabin, family members, travel group members, crew working in shifts at the same space and having cared for or had direct contact with respiratory secretions or body fluids of an active influenza-like illness. In addition, close contacts may be considered to include other fellow travelers that may have had prolonged close proximity contact with an ill passenger in crowded and semi-closed environment on board (e.g. during collective indoor recreational activities requiring close proximity or regularly having meals together with the infected person), according to case-by-case risk assessment within the previous seven days. In all cases, the ship's medical staff is responsible for listing names of these close contacts (World Health Organization, 2009).

- Oxygen set
- Ethanol 70% hand cleanser
- Gloves
- Masks
- Prednisone

Additional items recommended by specific WHO Guidelines on H1N1 influenza (World Health Organization, 2009)

- Antivirals (oseltamivir and/or zanamivir)
- Adequate lab sample medium and packaging
- Disinfectants
- Hand hygiene supplies

Surveillance

Standardised surveillance data for ILI should be recorded in the ship medical log (see Part A, Chapter 2) (Brotherton et al., 2003; Centers for Diseases Control and Prevention, 2001; Ferson et al., 2000; Miller et al., 2000; Miller et al., 1998). A standardised definition for ILI should be used, such as the WHO definition provided below (Centers for Diseases Control and Prevention, 2001; Ferson et al., 2000).

Clinical Criteria

Definition for ILI (WHO)

Patient presents with:

- sudden onset of fever of ≥38°C (100°F)
  and
- cough or sore throat

in the absence of other diagnoses.

Definition for Acute Respiratory Illness (EC)

Patient presents with:

- sudden onset of symptoms
  and
- at least one of the following four respiratory symptoms:
  - cough
  - sore throat
  - shortness of breath
  - coryza

  and
  - a clinician's judgment that the illness is due to an infection.

Data in the medical log (Annex 8) should include, at a minimum: patient age, sex, onset date of symptoms, symptoms, complications (e.g. difficulty of breathing, purple or blue discoloration of the lips, vomiting or signs of dehydration), pre-existing medical conditions (e.g. asthma, diabetes, heart

disease or pregnancy), recovery or death, country of residence and/or destination, vaccination and results of diagnostic testing (e.g. rapid viral and bacterial tests, chest x-ray).

Data in the ship medical log should be routinely reviewed to assess trends in disease frequency (Centres for Diseases Control and Prevention, 1999). If the number of passengers or crew with ILI exceeds the threshold levels (provided in Annex 26) then an outbreak is occurring.

The ship's master should be informed and remedial actions should be taken to contain the outbreak.

A designated member of crew should be responsible for:

- reviewing the medical data collected in the medical log;
- identifying trends in the number of cases;
- supervising hygiene, preventive and control measures and awareness policy;
- coordinating outbreak management, if necessary.

Active surveillance (case finding)

Case finding among passengers and crew should be initiated by the ship's medical staff in order to detect new cases of ILI once an influenza outbreak has been identified (Centers for Diseases Control and Prevention, 2001; Centres for Diseases Control and Prevention, 1999; Centers for Diseases Control and Prevention, 1998; Miller et al., 1998). Case finding should include directly contacting passengers (e.g. passenger surveys) and crew and findings should be recorded.

Diagnosis and treatment

Seasonal influenza – disease characteristics

Incubation period	Usually 1-3 days
Duration of illness	2-7 days
Period of communicability	In adults, influenza is transmissible from 1 day before symptom onset until 7 days after onset. Children can transmit the virus 10 or more days after symptom onset. Immunocompromised people can shed virus for weeks to months after infection.
Case fatality rate	Influenza is rarely fatal: 0.1% and 0.2%
Attack rate	During outbreaks of seasonal influenza in cruise ships: 0.5 to 37%
Symptoms	Fever
	Cough
	Headache
	Muscle and joint pain
	Sore throat
	Runny nose

Rapid influenza diagnostic tests may be available on board (European Commission of the European Communities, 2009; Health Protection Agency, 2009; International Maritime Health Association, 2009; World Health Organization, 2009; Brotherton et al., 2003; Uyeki et al., 2003; Centers for Diseases Control and Prevention, 2001; Miller et al., 2000; Centres for Diseases Control and Prevention, 1999a; Centers for Diseases Control and Prevention, 1998). However, results of these tests should be interpreted with caution and false negative results should be taken into consideration*, since the tests have very low sensitivity (50-70%). Influenza rapid test kits may be of assistance in investigations as early indicator of the likely cause of an outbreak (Brotherton et al., 2003). If an influenza outbreak is suspected, in order to support the diagnosis, the rapid viral tests can be used as early indication, but nasopharyngeal specimens should be collected simultaneously for viral isolation (MMWR, 2001). Moreover, rapid diagnostic tests do not identify the subtypes of the virus (e.g. H3N2 or H1N1), but only the group (e.g. influenza A or B).

Treatment including antivirals should be given based on medical assessment, case by case evaluation and according to ECDC and WHO recommendations.

Antivirals may be given to close contacts of ill persons (Brotherton et al., 2003; Centers for Diseases Control and Prevention, 2001; Miller et al., 2000; Anon. 1997) and particularly to those at high risk for complications.

Isolation

All patients presenting with symptoms of ILI should be isolated in cabins (Brotherton et al., 2003; Centers for Diseases Control and Prevention, 2001; Centres for Diseases Control and Prevention, 1999a;) for at least 24 hours after they are free of fever (without the use of fever-reducing medications).

It is important to limit the people who come into contact with isolated patients. Crew involved in the care of cases of ILI (including housekeeping and food and beverage crew) should not be in an at-risk group for influenza complications.

Social distancing

During an outbreak, people should be encouraged to avoid hand shaking and practice social distancing.

*It should be taken into consideration that the sensitivity and specificity of rapid tests vary: sensitivities are approximately 50-70% and specificities are approximately 90-95%. Collection of specimens to be used with rapid tests should be done as close as is possible to the start of symptoms and usually no more than 4-5 days later in adults. The interpretation of positive results should take into account the clinical characteristics of the case. If an important clinical decision is affected by the test result, the rapid test result should be confirmed by another test, such as viral culture or polymerase chain reaction (CDC: HTTP://WWW.CDC.GOV/FLU/PROFESSIONALS/DIAGNOSIS/RAPIDLAB.HTM).

Hygiene measures and personal protective equipment

Hand hygiene

Passengers and crew should wash their hands frequently, as shown in Annex 14.

During an outbreak, alcohol-based hand antiseptics containing 60 to 90% ethanol concentration are effective against the influenza virus and should be available in places where hand washing is needed and no hand washing facilities exist.

Cleaning and disinfection

Crew responsible for cleaning contaminated areas should be trained in order to:

- properly use PPE (gloves, masks);
- follow protocols for disinfecting and cleaning materials which have been contaminated by body fluids;
- properly manage waste;
- avoid cross contamination.

During non-outbreak situations, environmental infection control should focus on regular cleaning (and disinfection where needed) of the ship accommodation spaces. The ship's medical facility should have a plan for cleaning and disinfection.

During outbreaks, effective disinfection procedures should be performed more rigorously. All surfaces touched frequently by hands should be disinfected regularly (e.g. door handles, hand rails, elevator buttons, telephones, keyboards, tabletops, chair arms, toilet flush handles, tap handles, equipment handles, slot machines, sports equipment and other similar equipment). Disinfection should focus on additional areas such the cabins or other rooms occupied by infected people. Vacuuming of carpets should not take place in cabins occupied by infected people, unless the carpet has been previously disinfected.

Disinfectants used should be effective against influenza virus and used according to the manufacturer instructions (concentration, contact time etc). Different disinfectants and disinfection protocols may need to be applied to porous and non-porous surfaces.

Waste management

Infectious waste should be handled separately from the other types of waste on board and properly labelled and disposed of (see Part A, Chapter 9).

Personal protective equipment

Health care workers and crew that come into contact with passengers or crew diagnosed with an ILI should use face masks and disposable gloves. Personnel responsible for cleaning, or other persons entering an area occupied by patients must use disposable PPE (face masks and disposal gloves).

3 Before disembarkation

Reporting

MDH

For ships on international voyages, the MDH according to IHR should be completed and sent to the competent authority according to the local requirements in the port of call. Some ports require the submission of MDH by all arriving ships. However, according to IHR the competent authority of the next port of call must always be informed if an infection or death has occurred on board.

National requirements for reporting

Additional reporting may be required according to the national legislation applied in the port of call.

In the EU, a specific case definition for reporting of influenza has been adopted. Possible, probable and confirmed cases of influenza must be reported to the competent authorities.

Figure 1 presents the clinical, epidemiological and laboratory criteria of reporting and the reporting requirements for seasonal influenza.

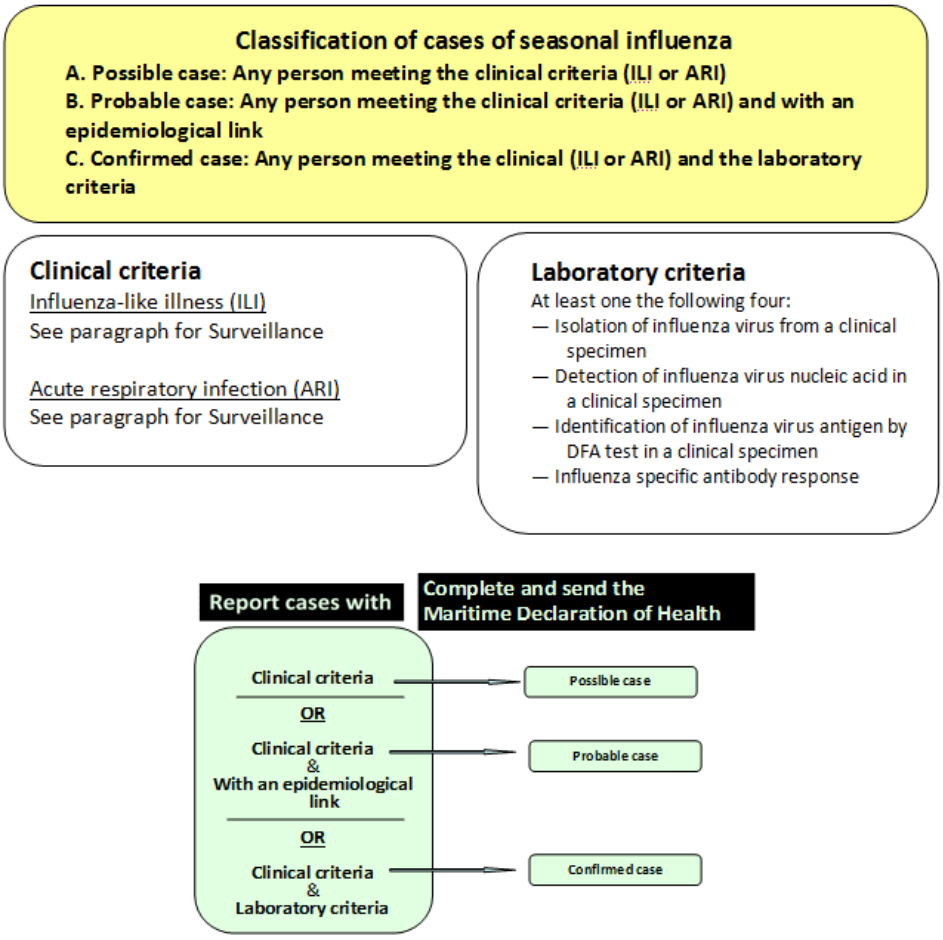

Figure 1: Requirements for reporting of seasonal influenza to the competent authorities in the EU

Shore side identification

The competent authorities should be informed if any support is needed before the ship arrives at the port. Information about what assistance is required should be provided, such as:

- The number of ill people who need hospitalisation.
- The number of clinical specimens which need to be sent for examination.
- Any needs of supplies: disinfectants, PPE, medication etc.

4 After disembarkation

Ill persons should not come into contact with other persons who disembark or are about to board the ship.

Ill persons should disembark together with their luggage, personal items etc. from a separate area of the ship or at a separate time from which healthy persons disembark or embark for the next voyage.

During an outbreak, disinfection of frequently touched surfaces of the terminals should be considered (such as hand rails, handles etc.).

If during the previous voyage an outbreak occurred, then informative leaflets can be disseminated to passengers and crew on the next voyage in order to increase awareness and avoid a subsequent outbreak.

5 Competent authorities' actions

In the EUMS, actions of competent authorities at ports in response to infectious diseases occurring on passenger ships are regulated by the IHR 2005, EU legislation and national legislation.

The competent authorities' task is to take all the necessary measures in order to protect public health on board and to prevent the spread of a disease from the ship to the community.

The responsibilities of competent authorities regarding their response to a case of ILI on ships may vary among countries. Generally, the competent authorities' role is to perform a risk assessment in case of a threat of infectious diseases, to advise, implement or supervise response measures to be taken, to ensure that all appropriate measures are in place to protect public health on board and to prevent the spread of a communicable disease from the ship to the community. These measures must be in accordance with the international and national law and commensurate to the risk that the disease poses without causing unnecessary interference to international traffic. Consequently, public health measures should not disrupt the ships itinerary, disembarkation, or travellers' ability to enjoy the voyage and destination, unless the rationale behind this is provided and such actions are fully justified.

Consistent policy, coordination and standardisation of competent authorities' actions among the EU countries and within the same country are important in order to prevent outbreaks and to avoid the duplication of actions and unnecessary intervention (Mouchtouri et al., 2009).

Personnel at competent authorities may consider entering a ship when an outbreak occurs in order to monitor all the necessary measures to contain the outbreak.

In response to outbreaks of seasonal influenza competent authorities may be involved in the following:

- Ensuring that all the necessary measures described previously have been taken on board the ship in order to prevent the spread of the virus.
- Receiving specimens from ships and sending them to the laboratory for analysis.
- Supervising or making arrangements for the disembarkation of ill persons in such a manner which avoids the spread of the virus.
- Arranging transport of persons with severe symptoms to a health care facility.
- Notifying all possible, probable or confirmed cases according to the national surveillance requirements.
- Communicating information to the public, if it is necessary.

B. Specific guidance during an influenza pandemic

The influenza virus is characterised by a great antigenic variability. Major modifications, called antigenic shifts may occur and result in worldwide epidemics also known as pandemics.

During a pandemic situation, additional or more rigorous control measures may need to be implemented both on board ships and on land. Any control measures imposed which affect the travelling public should be commensurate with the risk that the causative agent of the pandemic poses to travellers and the general public. Important factors that can be used for the risk assessment include characteristics of the infectious agent such as pathogenicity and virulence (hospitalisation rate, case fatality rate etc.), immunity of the travelling population, general public and risk groups, and the incidence of the disease and geographical distribution based on information provided by local, national, European or international organisations and agencies such as ECDC and WHO.

The types of control measures implemented are likely to change as a pandemic evolves. Control measures are likely to be stringent at the beginning of a pandemic as little will be known about the new virus strain, and with limited geographic spread, focus will be on preventing the spread of the disease to new areas. As information on severity of disease, infectivity and risk groups is gathered, it is likely that control measures will be modulated to best suit the evolving situation. As the disease spreads globally, a shift in control strategies is likely to occur.

The WHO and ECDC give information and guidance regarding public health interventions during a pandemic. Ships should adopt policies in order to comply with public health measures that the competent authorities in Member States implement.

The following guidelines can be modified and applied during an influenza pandemic, depending on the characteristics of the pandemic.

Pre-embarkation

Denial of boarding: This will depend on the severity of the disease and the infectivity of the infectious agent. During the first period of the pandemic, it is reasonable that travellers with symptoms would be denied boarding. If the virus is highly pathogenic and the disease has a high fatality rate, then denial of boarding for symptomatic passengers would continue for the duration of the pandemic. In situations where the symptoms are mild to moderate, this approach may be relaxed and ill people isolated on board, as is recommended for seasonal influenza.

Vaccination: Vaccination of crew and passengers, with priority to those in at risk groups, could be considered when a vaccine for the new strain of the virus becomes available. Vaccination might also be considered for employees working in the tourist sector such as guides, agents, tour operators, bus drivers and terminal station personnel during pandemic situations.

During the voyage

Epidemiological information: Patients may be asked for information regarding contacts with ill persons or visits to affected countries. This could be done either by the ship crew or in collaboration with a competent authority at ports.

Communication: Reminder messages through public announcements or daily newsletters and notes presented to the crew television can be used to increase awareness during a pandemic. Information that it is necessary to disseminate to travellers includes: symptoms, preventive measures such as hygiene rules, special consideration for at high risk groups and what to do in case of relevant symptoms.

Isolation: The isolation period should be for at least 24 hours after they are free of fever (without the use of fever-reducing medications) and will depend on other disease characteristics such as severity and infectivity. During the first period of a pandemic, the characteristics of the causative agent, including the period of infectivity, would not be known. Isolation and the use of PPE would be essential.

Quarantine: Quarantine of crew or passengers that are not displaying symptoms but are suspected to be infected due to contact with cases, may be considered.

Before disembarkation

Reporting: Additional requirements for disease reporting as well as for reporting all previous ports of call may be implemented by national authorities.

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Guideline II

Prevention and control of gastroenteritis on passenger ships

Purpose

This chapter sets out recommendations for the control of gastroenteritis on passenger ships. The overview is followed by detailed guidance on how to recognise outbreaks of viral gastroenteritis, the modes of transmission of all forms of gastroenteritis, control measures and the management of outbreaks.

The layout of this chapter is suggested as a guide to ship companies, ships' crews, port health authorities and others to enable them to conduct their own analysis of their vulnerabilities and to assist in identifying mitigation actions.

1 Overview

Ships are no different from land-based hotels or residential establishments in that both will have people becoming affected by gastroenteritis from time to time. Some of these illnesses are directly transmissible to other people or have a preventable source. Though passenger ships probably do not have a higher level of infectious gastroenteritis than ashore, outbreaks on ships tend to be reported in the news more often, which may give the impression that they occur more frequently there.

Gastroenteritis may be acquired directly from another person, through contaminated food or drinking water or through environmental sources. These infections can be caused by viruses, bacteria or protozoa. Gastroenteritis can also be caused by a release of toxins from bacteria or fungi that have grown on foodstuffs. It can also be caused by chemical contamination of food or water.

The major modes of infection are from hand to mouth by touching something which is contaminated, by eating or drinking a contaminated foodstuff or beverage or, in the case of viral infections, by breathing in aerosolised virus. The characteristics of a virus, compared to a bacterium, means that viral infections will spread very easily and require very prompt intervention if spread is to be prevented. Though viral gastroenteritis, e.g. norovirus infection, is unpleasant, it usually resolves quickly without side-effects. By contrast, bacterial gastroenteritis, e.g. salmonella infection, usually takes longer to develop and produces more severe symptoms, which last longer and which may require hospitalisation or even cause death in some circumstances.

Norovirus is the commonest cause of outbreaks of gastroenteritis ashore and frequently occurs in such places as schools, retirement homes and hospitals. When it happens on board a ship, it is usually because someone is infected ashore and comes on board either with illness or incubating it. If they have diarrhoea or vomiting, they will excrete large numbers of viral particles which will contaminate surfaces very easily. Vomiting creates clouds of aerosolised virus which, being airborne

as droplet nuclei, can spread the virus over large areas. One person with norovirus can potentially infect a large number of people. The outbreak may continue if effective control measures are not put in place.

However, with all types of gastroenteritis, good hygiene practices, both personal and food-handling, together with safe food sources and drinking water integrity, are the key issues in the prevention of outbreaks.

2 How to differentiate gastroenteritis outbreaks

The presenting symptoms indicate the nature of the illness;

	Virus infection	Bacterial infection
Onset	Usually sudden. People go from feeling well to feeling ill very quickly. May be confused with sea-sickness.	Onset is often more gradual.
Vomiting	Usually present. May be the only symptom. Often occurs frequently in a short period of time.	May be present.
Diarrhoea	Often present, usually very watery	Almost always present. May be bloody.
Fever	Rare	Affects up to 25% in those >65 years old.
Headache, muscle aches	Fairly frequent	Can occur, but less frequently.
Abdominal cramps	Frequent	Frequent
Severity	Usually mild	Usually more serious, often severe, occasionally life-threatening
Duration of symptoms	Short-lived. Usually 1-2 days	Often 5-10 days

The incubation period of viral gastroenteritis (and in particular norovirus) is short, usually 24-48 hours. Symptomatic people will produce very large numbers of viral particles in their faeces or vomit. The infective dose is very low (probably 10-100 virus particles). These two characteristics combine to give a high rate of secondary cases in people sharing a cabin. Usually, only supportive medical treatment is required.

Viral gastroenteritis may well be the cause of illness if the following characteristics apply:

- An abrupt onset of symptoms.
- Fever is usually absent.
- The severity of illness is mild rather than serious.
- There is a steep rise in cases on a daily basis.
- Secondary cases are common among close contacts.

If viral gastroenteritis is the presumed diagnosis, the emphasis should be on early application of specific control measures (section 6.1) to prevent spread. If the symptoms of the first cases are more consistent with bacterial infection or food intoxication, then an immediate investigation into possible food- or water-borne infection is necessary.

3 Modes of transmission of gastrointestinal illness

The main modes of transmission of gastroenteritis are:

- Direct faecal-oral. This is where the hands become contaminated, e.g. with faeces during a visit to the toilet and they are not washed adequately afterwards. If the mouth is subsequently touched, transfer of microorganisms takes place. The infective dose of each organism is critical here. The infective dose for salmonella is approximately 1,000 bacteria, usually equivalent to visible faecal contamination. Normal hand washing with soap and hot water will reduce the bacterial load on the skin below that necessary to cause infection. By contrast, the infective dose for *Shigella* (or norovirus) is approximately 10 organisms; so that even hands that look clean can still transfer more than an infective dose.
- Foodborne (see Part A, Chapter 3). This is where food becomes contaminated, usually by contact with human or animal faeces. If contamination is bacterial, they may then multiply in the food if it is not stored at an appropriate temperature (5°C, 41°F or less*). One major route of infection is by cross contamination between raw and cooked food which is then not thoroughly reheated (above 63°C, 145°F) before serving. This can also affect foods which are either not cooked, or only lightly cooked, e.g. salads and shellfish. Similarly, contamination can occur from an infected food handler of ready to eat foods that are handled without subsequent cooking (e.g. salads and sandwiches).
- Toxin production. Another mode of foodborne transmission is where a microorganism grows within the food, producing a bacterial toxin, which then causes illness, e.g. *Clostridium perfringens*. This is commonly found when temperature control of cooked food has been poor, with food left at warm temperatures for long lengths of time. Many of the toxins produced, e.g. Clostridia or *Staphylococcus aureus*, are heat-stable and will not be destroyed by subsequent reheating.
- Waterborne (see Part A, Chapters 4 and 5). This is usually due to faecal contamination of potable water supplies, where the disinfection process used has either failed or been unable to cope with the nature of the contamination, e.g. protozoa like *Cryptosporidium* spp., or the high level of contamination, e.g. when chlorine becomes deactivated in contact with protein from unclean tanks and therefore ineffective. Similarly, contaminated recreational water can be a source of infection.
- Environmental contamination. Similar to faecal-oral above, but the microorganisms are transferred by touching things or surfaces which have become contaminated. This is particularly important for viral infections, where airborne spread is readily generated by aerosols created by vomiting or toilet flushing. These aerosols can disperse quite widely and the virus particles then settle out.

* SHIPSAN recommends temperature at ≤5°C (41°F) as best practice however some EU countries require that food can be stored in a temperature of 8°C (46°F)

- Transmission from animals or vectors (see Part A, Chapter 6). GI pathogens can be transmitted from animals (e.g. pets or domestic) to a person. Rodents and insects such as flies and cockroaches can act as mechanical vehicles and contaminate food or surfaces.

4 Activity plan

The relationship of prevention and outbreak control activities by different agencies (ship, port health authorities, others) is shown in the table below;

Levels		Actions by the ship	Actions by the port health authorities	Actions by others
0	Every day preventive measures	Section 5.1	• Port health plan in place • Provide advice when requested	Section 5.2
1	Low-level gastroenteritis* activity on the ship (section 5.3)	Section 5.3	• Provide advice when requested	None
2	During an Outbreak†	• Activate Outbreak Management Plan (section 6) • Immediate control measures (section 6.1) • MDH/ notify port health authority of next port of call • SHIPSAN case/outbreak recording form or similar form or system used by the ship including the same information	• Disembarkation precautions • Review on board control measures • Convene outbreak control meeting, if required • Provide advice and support to ship • Inspect if appropriate • Consider need to notify in-country health protection service • Notify next port of call	Section 6.2
3	After the event	• Residual deep cleaning, if necessary • Lessons learned. Modification of the Outbreak Management Plan if required. • SHIPSAN case / outbreak recording form or similar form or	• Determine if the ship is safe to sail • Inform the next port-of call, if necessary • Forward results of microbiological samples	Section 7

* The SHIPSAN case definition for gastroenteritis is:
- Diarrhoea (three or more episodes of loose stools in a 24-hour period); **or**
- Vomiting **and** at least one of the following symptoms including one or more episodes of loose stools in a 24-hour period, or abdominal cramps, or headache, or muscle aches, or fever (temperature of ≥38°C, 100°F).

† The definition of an outbreak is an increase in the number of cases of gastroenteritis above the number normally occurring in that ship over a defined period of time and itinerary.
For reporting purposes, two different thresholds should be used. An initial report should be prepared and sent to the competent authority at ports, when the percentage of reportable cases reaches 2% or more among passengers or 2% or more among crew. A second report should be sent when the number of cases reaches 3% or more among passengers or 3% or more among crew (US VSP).

		system used by the ship including the same information		

5 Everyday preventive measures/actions

5.1 Level 0 Everyday preventive measures/actions by the ship

General

- Examples of preventive measures are shown in Annex 27.
- An information leaflet should be given to passengers, either on arrival on board or in the event of an outbreak ("pillow letter": identifying symptoms, personal hygiene and guidance for those who become affected).
- There should be an agreed Outbreak Management Plan, which specifies the duties for all crew members and responsibilities of the outbreak management team. HACCP principles can be applied to identify critical control points and help to develop a plan for outbreak management. Hazard analysis in prevention of gastroenteritis transmission on board ship can be found in Annex 28.
- Crew members are our eyes and ears – there should be regular training to maintain awareness.

Medical

- The GI log (see Part A, Chapter 2) should be maintained and monitored, with alertness for the outbreak threshold.
- Early diagnosis is crucial. Medical staff should be aware of the case and outbreak definitions.
- It is recommended that anyone who presents with gastrointestinal symptoms should be isolated. For passengers this should be for a minimum of 24 hours, preferably 48 hours, after resolution of their symptoms and for food handling and medical crew for a minimum of 48 hours. Ill people need to be separated from those who are well.
- People should be encouraged to report if they become symptomatic and should be isolated in their cabins, using only their own bathrooms/toilet facilities. Treatment of cases should occur in their cabins wherever possible. Provide hygiene advice to them and any contacts. Provide room service or beverages to them where appropriate.
- Where possible, crew should be isolated on their own or, where several are affected, they may be accommodated together (cohorting).
- The importance of effective hand hygiene should be emphasised (see hand hygiene below).
- A pre-prepared standard questionnaire about illness/activities/meals should be available in the ship's hospital (for example see Annex 9).

- Faecal specimens should be collected for analysis during every outbreak. The threshold to initiate collection of these confirmation samples should be defined in advance. Proper faecal specimen collection containers should be available.

Cleaning

- Standard cleaning and disinfection procedures should be carried out by trained and supervised staff.
- There should be an agreed protocol for action in the event of a body fluid spillage in a public area. If there is a vomiting or diarrhoea event in a public area, it should immediately be covered and made inaccessible until cleaned by designated cleaners. This should be part of a protocol.
- Disinfectants effective against norovirus should be always available and used routinely in the cabins of any passengers/crew suffering from gastroenteritis (Annex 29).
- Environmental cleaning should be performed (Annex 30) with an appropriate virucidal disinfectant. All public toilets and hand contact surfaces, e.g. handrails, should be cleaned on a regular basis, which should be increased in frequency if an outbreak is occurring. The most effective way of removing viral contamination is to clean with detergent before applying disinfectant. Fresh sodium hypochlorite solution (1,000 mg/L) with a contact time of one minute is effective against norovirus. Public toilets should be cleaned routinely and according to the level of the gastroenteritis action plan (e.g. every 4 hours and hourly during an outbreak). However, it is an irritant, frequently controlled under health and safety legislation and unsuitable for use on many soft fabrics which will be discoloured by it. Other disinfectant agents have been developed that are less damaging to furnishings and are now commonly used by the passenger ship industry. The advantages and disadvantages of these products need to be considered. There are also many products for which extravagant marketing claims are made unsupported by any rigorous scientific evidence. This is an area which needs more scientific research. A list of some disinfectants for which virucidal activity is claimed is shown in Annex 29.
- Cleaning staff (trained) should be wearing disposable gloves routinely. During an outbreak they should use additional protective clothing (disposable gloves and aprons).

Hand hygiene

- Explaining what is meant by "thorough hand washing" is important; rubbing the hands in hot water, preferably with a liquid soap, for at least 20 seconds followed by drying with a disposable towel (Annex 14). This is essential to mechanically remove any microorganisms from the skin. Using an alcohol-based hand gel alone is insufficient as alcohol is not an effective disinfectant for norovirus (Annex 29).

5.2 Level 0 Everyday preventative action by shipping companies

- Some shipping lines provide health advice to passengers before joining the ship and may also send a pre-embarkation health questionnaire (see Annex 24). Where this has not happened, routine health advice should be provided on board, either in the on board activity programme or in guests' cabins. If there has been an outbreak on the previous cruise, passengers should be informed of this with instructions for hand washing and reporting of any gastrointestinal symptoms.
- The shipping company should have a protocol for disembarking symptomatic passengers, including written guidance for coach and taxi drivers and airlines (if appropriate). Where appropriate, they should also have a contingency plan for hotel accommodation for those too unwell to travel.
- The industry is encouraged to develop policies promoting hand washing in passengers and crew.

5.3 Level 1 Low-level gastroenteritis activity – action by the ship

- The ship should have clearly defined thresholds for determining when there are raised numbers of cases on board and triggering control measures. This will depend on the number of passengers, the length of the cruise and on the itinerary.

  Examples of such thresholds are;

  - 6 gastrointestinal cases within 6 hours;
  - 1% of guests on ships with less than 1000 passengers;
  - 0.5% of guests on ships with more than 1000 passengers.
- Symptomatic people should be confined to their own cabins. Their close contacts should be given appropriate hygiene and hand washing advice.

6 Level 2 Management of an outbreak

6.1 Level 2 Management of an outbreak – actions by the ship

It is vital that the ship has an Outbreak Management Plan prepared in advance (Annex 31), with all crew aware of their responsibilities. The plan should include the following:

- Clearly identifiable outbreak criteria. A system to monitor the GI log such that elevated cases of gastroenteritis above what might be expected will trigger an alert.
- Arrangements for clinical support to diagnose cases. It is recommended that telephone advice is available.
- Declaring an outbreak. The most common definition of a gastroenteritis outbreak on board ship is when an increase in the number of cases of gastroenteritis above the number normally occurring in that ship over a defined period of time and on a specific itinerary. For reporting purposes, two different thresholds should be used. An initial report should be

prepared and sent to the competent authority at ports, when the percentage of reportable cases reaches 2% or more among passengers or 2% or more among crew. A second report should be sent when the number of cases reaches 3% or more among passengers or 3% or more among crew (see also table footnotes). Case definition is EITHER diarrhoea (3 or more episodes of loose stools in 24 hours) OR vomiting and at least one additional symptom (one or more episodes of loose stools, abdominal cramps, headache, muscle aches or fever).

- Immediate control measures on suspicion of an outbreak
  - Inform key managers/crew.
  - Promote awareness of possible cases.
  - Isolate of affected people in their cabins until clear of symptoms for up to 24 hours (preferably 48 hours) and 48 hours for crew.
  - Treat cases in their cabins wherever possible. Provide hygiene advice to them and any contacts. Provide room service to them.
  - Commence an enhanced cleaning regime, in accordance with ship's policy. This should specify the areas to be cleaned, the frequency of cleaning and the virucidal disinfectant to be used.
  - Stop self-service of food and beverages wherever possible.
- Convene an on board outbreak management team. The role of the team is to ensure the following are considered:
  - Who is leading the team?
  - Is an outbreak occurring?
  - What additional prevention or control measures required.
  - Provide information to passengers and crew (thorough hand washing, immediate reporting of symptoms, remaining isolated until medically assessed).
  - Emphasise the need for people to shower before using recreational water amenity.
  - Collect appropriate specimens. Arrange appropriate shore side testing.
  - Collect and analyse epidemiological data (such as food histories) to identify the cause of the outbreak.
  - Investigate galleys, potable water supplies or recreational water areas where appropriate.
  - Liaise with shore side Port Health according to local regulations.
- Submit a MDH to the next port of call as required by that country.
- Set criteria for declaring the outbreak over. Reduce the additional measures and record any lessons learned.

6.2 Level 2 Outbreak actions by others (agencies and owners)

- Shipping line – will need to consider whether additional support to the ship is necessary, or if additional control measures are needed.
- Port health authorities – Guiding questions could include: Is the ship managing the outbreak satisfactorily? Is an inspection necessary? Have the arrangements for collection of biological specimens been made known to the ship? Is additional support to the ship required? Are changes to the disembarkation procedures necessary? Is there a need to involve other agencies, e.g. the in-country health protection service? Have arrangements for sending information to the ship after departure been made clear (e.g. microbiology test results)? Is there a need to contact the port health authority at the next port of call?
- In-country health protection service – may need to consider if an epidemiological investigation is justified or if additional support is needed by the port health authority.

7 Level 3 After the outbreak action

- There should be enhanced cleaning carried out on the ship on turnaround days to help prevent a continuation of illness into the next voyage.
- The results of any epidemiological investigation by the in-country health protection service should be shared with the port health authority, the ship and the shipping company as early as possible, as operational decisions may remain to be taken depending on the outcome.

8 Further guidance

An extensive bibliography of scientific publications can be found on the SHIPSAN website. Annex 27 provides an example analysis in prevention of gastroenteritis transmission and Annex 32 describes the epidemiology of gastrointestinal illness on board ships.

The Centres for Disease Control Vessel Sanitation Program have publications on gastroenteritis and norovirus on board ships at WWW.CDC.GOV/NCEH/VSP/PUB/PUB.HTM.

The Health Protection Agency (London) has published, jointly with the Association of Port Health Authorities and the Marine and Coastguard Agency, *Guidance for the Management of Norovirus Infection on Cruise Ships*, July 2007, available at WWW.HPA.ORG.UK (select Publications then Guidance Documents and enter *cruise ships* in the dialogue box).

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Guideline III

Prevention and control of legionellosis on passenger ships

Purpose

- To provide guidance on preventing the colonisation of ships' water systems by *Legionella* bacteria.
- To provide guidance for case/cluster/outbreak investigation.
- To harmonise competent authorities actions in the EU.

1 Overview

Legionnaires' disease was first recognised as a human infection in 1976 and the first ship associated case was recorded in the Mediterranean in 1977 (Meenhorst, 1979). Since then it has continued to be a public health concern on passenger ships. These guidelines describe how the water systems on ships can be colonised and how infection may occur. They also detail preventive measures for the every day operation of the ship, as well as the actions that should be undertaken when possible or confirmed cases have occured. Preventive and control measures, based on the European Guidelines for Control and Prevention of Travel Associated Legionnaires' Disease (European Working Group for Legionella Infections, 2005) are given for cold and hot water distribution systems, hot tub/spa pools, decorative fountains and air handling systems. Annex 33 provides background information on Legionellosis, the causative agent and outbreaks on ships.

What supports *Legionella* colonisation – characteristics of ships?

- **Water temperature between 25-45°C (77-113°F)**: Due to the extended length of pipes it is difficult to maintain high temperature in all parts of the ship's hot water system and low temperatures in the cold water system.
- **Design of the water system**: Ship water systems may be complex in nature and can be altered during refits; contain plumbing materials that may no longer be approved; may have deadlegs/blindends present; be difficult to control; have limited access for monitoring, maintenance and repairs.
- **Standing water:** Large capacity water tanks and extended water storage time may result in a low chlorine residual in the water. Low cabin occupancy and water system repairs need to be considered. Standing water encourages formation of biofilms.
- **Build up of deposits**: Scale, corrosion, and sludge may build up in the base of calorifiers.
- **Cleaning:** Cleaning of water system pipes, taps, showers and tank surfaces may be difficult due to limited access. Removal of deposit, and measures to reduce biofilm and nutrients is required.

- **Materials**: Natural rubber and natural fibres should not be used in washers and seals. Only materials approved for contact with drinking water and shown not to encourage microbial growth should be used for construction of water systems.
- **Water treatment:** Disinfectant and contact time may be used methods to reduce the bacteria.
- **Piping complexity:** Piping of recreational water facilities and other equipment is often complicated and in confined spaces, making it difficult to inspect and maintain.
- **Knowledge:** There may be limited expertise available on board.
- **System alterations:** Water systems on board ship are often complex. Alterations and running repairs can result in deadlegs/blindends.

How the infection occurs

Tiny aerosolised droplets of water contaminated by legionellae bacteria are inhaled or contaminated water is aspirated. The water in these aerosolised droplets rapidly evaporates leaving dry particles (droplet nuclei) containing any bacteria in the original droplet. The aerosolised droplets or particles are too small to see with the naked eye but can enter the lung of a person and start to multiply, causing an infection. Infection cannot be transmitted from person to person. There are two main types of respiratory infection caused by legionellae: Pontiac fever (an acute, self-limiting, ILI without pneumonia) and Legionnaires' disease (a rapid and potentially fatal pneumonia). In addition legionellae very rarely cause non pneumonic infections. All are described by the term "legionellosis".

Legionellae in ships' facilities

Legionella spp. can colonise any water system containing water between 25-45°C (77-113°F) but grow most rapidly between 30°C (86°F) and 45°C (113°F). They may colonise air conditioning systems, swimming pools and other recreational water facilities, saunas, evaporative condensers, humidifiers, water systems in dental units, respiratory therapy devices, taps, shower heads, water-closets, decorative fountains, hoses, filters, softeners and other features of the distribution system.

Legionella spp. have been isolated from water samples taken from hot and cold potable water distribution systems (Goutziana et al., 2008; Azara et al., 2006) and hydrotherapy systems and spas (Kura et al., 2006b; Jernigan et al., 1996a) of passenger ships.

Water distribution systems (Castellani et al., 1999) and whirlpool spas of passenger ships (Kura et al., 2006a; Jernigan et al., 1996b) have been identified as a source of infection, while a possible link with an air-conditioning system has been documented (Joseph et al., 1995).

Legionella colonisation is a particular problem in hot tubs and spas because the water is maintained at a high temperature that supports the growth of the bacteria. Furthermore, dead skin cells and dirt from bathers act as nutrients to the bacteria, the piping provides a surface for biofilm growth as in potable water system and finally, bubbles create aerosolised water droplets that can be inhaled.

2 Legionellosis disease prevention and control on ships

2.1 Every day preventive measures on board ships

2.1.1 Medical issues

- Ship medical crew should be aware of the **symptoms** of legionellosis, **incubation period and case definition**, which are described in Table 4 and Table 5.

Table 4: Legionnaires' disease and Pontiac fever characteristics (World Health Organization, 2007)

Characteristics	Legionnaires' disease	Pontiac fever
Incubation period	2–10 days, rarely up to 20 days	5 hours – 3 days (most commonly 24–48 hours)
Duration	Weeks	2–5 days
Case–fatality rate	Variable depending on susceptibility; in hospital patients, can reach 40–80%	No deaths
Attack rate	0.1–5% of the exposed general population 0.4–14% in hospitals	Up to 95% of the exposed population
Symptoms		
ILI (moderate to severe influenza)	+/-	+
Often non-specific	+	-
Loss of strength (asthenia), tiredness	+	+
High fever	+	+
Headache	+	+
Dry cough	+	+
Sometimes expectoration blood-streaked	+	-
Chills	+	+
Muscle pain (myalgia)	+	+
Joint pain (arthralgia)	-	+
Difficulty in breathing (dyspnoea), chest pain	+	-
Difficulty in breathing (dyspnoea), dry cough	-	+
Diarrhoea	25–50% of cases	+
Vomiting, nausea	10–30% of cases	In a small proportion of people
Central nervous system manifestations, such as confusion and delirium	50% of cases	-
Renal failure	+	-
Hyponatraemia (Serum sodium <131 mmol/L)	+	-

Lactate dehydrogenase levels (>700 units/mL)	+	-
Failure to respond to beta-lactam antibiotics or aminoglycosides	+	-
Gram stain of respiratory specimens with numerous neutrophils and no visible organisms	+	-
Chest pain	+	-

Table 5: Case definition for Legionnaires' disease (Commission Decision 2008/426/EC)

Characteristics	**Legionnaires' disease and Pontiac fever**	
<u>Confirmed case</u> is a clinically compatible case that is laboratory confirmed		
Clinical description	**<u>Legionnaires' disease</u>** Pneumonia	**<u>Pontiac fever (European Working Group Legionella Infections, 2005)</u>** A self-limiting ILI characterised by fever, headache, myalgia and non-productive cough. Patients recover spontaneously without therapy after 2 to 5 days. No signs of pneumonia.
Laboratory criteria for confirmed diagnosis of legionellosis	– Isolation of *Legionella* spp. from respiratory secretions or any normally sterile site. – Detection of *Legionella pneumophila* antigen in urine. – *Legionella pneumophila* serogroup 1 specific antibody response.	
<u>Probable case</u> is a clinically compatible case that is tested by laboratory as probable (see below), or a clinically compatible case with an epidemiological link (environmental exposure or exposure to the same common source).		
Laboratory criteria for probable case*	– Detection of *Legionella pneumophila* antigen in respiratory secretions or lung tissue e.g. by DFA staining using monoclonal-antibody derived reagents. – Detection of *Legionella* spp. nucleic acid in a clinical specimen. – *Legionella pneumophila* non-serogroup 1 or other *Legionella* spp. specific antibody response. – *Legionella pneumophila* serogroup 1, other serogroups or other *Legionella* spp.: single high titre in specific serum antibody.	

- **Surveillance:** Cases of pneumonia or other respiratory symptoms should be recorded in the ship medical log.
- **Laboratory diagnostic methods** for *Legionella* include the urinary antigen test and culturing the organism from body fluids and tissues. Commercial enzyme immunoassays kits

* Laboratory results should be confirmed by a national reference laboratory.

are available for detecting *L. pneumophila* serogroup 1 antigen in urine and may be available on board. However, results of these tests should be interpreted with caution as false positive and false negative results can occur. Rapid diagnostic kits cannot be used for the detection of all *Legionella* spp. and serogroups. Most kits can detect only *L. pneumophila* serogroup 1, but patients may have been infected by other serogroups. Samples should be sent to a shore laboratory for confirmation, preferably to a national reference laboratory or other laboratory experienced in the diagnosis of Legionnaires' disease.

- One **named person** should be responsible for implementation of measures for *Legionella* control on board the ship. The named person should be trained in *Legionella* control. Other crew responsible for the operation of water systems on board should have knowledge of the importance of controlling *Legionella*.

2.1.2 Environmental health preventive measures

Water distribution system

Any WSP established on board the ship must include provisions for *Legionella* control. *Legionella* spp. colonisation must be included in the risk assessment of the water distribution system. Requirements for control measures, operational monitoring, record keeping and corrective actions for the potable water distribution are described in Part A, Chapter 4. Control measures such as temperature control, regular cleaning and disinfection, flushing, and actions after system repairs are described below.

Construction – materials

All water systems components should be made of appropriate materials. Materials such as natural rubber, hemp, linseed oil based jointing compounds and fibre washers should not be used in water systems. Materials and fittings for use in water systems should have been shown not to support microbial growth and be suitable for use in contact with potable water.

Water systems should be designed and constructed so as to avoid poor water movement and turnover.

Temperature control

Water systems should:

- avoid water temperatures between 25°C (77°F) and 49°C (120°F) to prevent *Legionella* colonisation;
- ideally, maintain cold water below 25°C (77°F);
- ideally, maintain hot water above 50°C (122°F).

It is recommended that hot water should be produced or stored at 60°C (140°F) and distributed such that a temperature at least 50°C (122°F), and preferably 55°C (131°F), is achieved within one minute at outlets. Care is needed to avoid much higher temperature because of the risk of scalding.

In addition to the monitoring of the water temperature at the tap it is useful to monitor the water temperature within the pipes by use of a contact thermometer. This is particularly important when thermostatic mixer valves are fitted to outlets. Measurement of the temperature of the hot water in the flow and return loops throughout the ship and not just the combined flows and returns to the water heater can rapidly detect areas of poor circulation. When operating efficiently there should only be a few degrees difference in the temperatures in the individual flows and returns.

Flushing

Stagnation or slow water movement encourages biofilms to form in the water system.

All taps and showers are to be run in cabins for several minutes at least once a week if they are unoccupied and always prior to occupation.

Regular cleaning and disinfection

The purpose of cleaning is to remove scale, salt, sediments, sludge, dirt and debris from the water tanks and distribution system.

Disinfection must be applied in order to reduce the number of microorganisms in the water to levels that cannot cause harm.

A schedule should be established for regular cleaning and disinfection of all water system components:

- Filling hoses (flushed for at least three minutes with potable water before use and disinfected at least every six months).
- Water system pumps (every six months).
- Water tanks (every year).
- Pipes and taps of the distribution system (every year).
- Hot water heaters (every year).
- Shower heads and taps (every six months or depending on the inspection findings).
- Hot water storage tanks (emptied when not in use).

Cleaning and chemical and thermal disinfection procedures for water distribution systems are described in Annex 34 and Annex 35.

Preventive measures during repairs and before cleaning

Before repairs to parts of the water system where water has a low flow rate or is static, water should be drained. Following repairs, that part of the system should be disinfected (Annex 34 and Annex 35).

If tanks and calorifiers are heavily contaminated with organic materials, then disinfection is necessary before and after cleaning. Where possible, aerosol generation during cleaning should be avoided.

PPE should be worn during cleaning (Annex 36).

Regular sampling

Regular sampling of the potable water system is recommended at least every 6 months. Table 6 presents the action levels following *Legionella* sampling in hot and cold water systems.

Table 6: Action levels following *Legionella* sampling in hot and cold water systems (EWGLI, 2005)

***Legionella* bacteria (cfu/litre)**	**Action required**
More than 1,000 but less than 10,000	Either: (i) If a small proportion of samples (10–20%) are positive, the system should be re-sampled. If a similar count is found again, then a review of the control measures and risk assessment should be carried out to identify any remedial actions; (ii) If the majority of samples are positive, the system may be colonised, albeit at a low level, with *Legionella*. Disinfection of the system should be considered but an immediate review of control measures and a risk assessment should be carried out to identify any other remedial action required.
More than 10,000	The system should be re-sampled and an immediate review of the control measures and risk assessment carried out to identify any remedial actions, including disinfection of the system.

Hot tubs and spa pools

Requirements and recommendations for the maintenance of hot tubs and spa pool are described in detail in the recreational water chapter of the manual, (Part A, Chapter 5) and include measures to control the proliferation of legionellae:

- Spa pools are to be treated with a free residual chlorine level of 3-10 mg/L the levels should be monitored at least every 1 hour.
- A complete draining, cleaning and renewal of the water should be done regularly.
- Sand filters are to be backwashed daily after use of the pool has finished.
- The whole system is to be cleaned and disinfected once a week.
- Air injection lines should be cleaned and disinfected preferably monthly.

Table 7 presents the action levels following *Legionella* sampling in spa pools.

Table 7: Action levels following *Legionella* sampling in spa pools

Legionella **(cfu/litre)**	**Action required**
More than 100	Close pool immediately and exclude the public from the area. Shock dose the pool with 50 mg/L chlorine for five hours circulating the water sufficiently to ensure all parts of the pipe-work are disinfected. Drain clean and re-disinfect. Review control and risk assessment and carry out any remedial measures identified. Refill and retest as soon as possible and then 1-4 weeks later. Keep closed until legionellae are not detected and the risk assessment is satisfactory.

Air handling and conditioning systems

Air handling and conditioning systems should be designed and constructed in order to avoid accumulation of water in ducts and allow cleaning and disinfection. Standing water in duct and condensate trays can potentially be contaminated by *Legionella*.

Filters of air conditioning systems should be inspected regularly and cleaned and disinfected, or replaced when necessary.

Drains should be regularly inspected in order to ensure that are properly working. Condensate trays and sumps should be regularly cleaned and disinfected.

Humidification if required should ideally be by steam injection. If spray type humidifiers are installed, then regular disinfection of the water spray system is needed (UK Maritime and Coastguard Agency, 1998).

2.2 Case/cluster/outbreak management

2.2.1 Medical issues

Identify cases and clusters

A case of Legionnaires' disease may be identified during the voyage, when a passenger or member of crew seeks medical consultation. Clinical or radiological evidence of pneumonia may suggest Legionnaires' disease. However, microbiological diagnosis is necessary for confirmation.

Alternatively, a case of Legionnaires' disease may be identified after the patient has disembarked. In this case, the ship may receive information about the incident through another source for example ELDSNet or a national surveillance centre. However, the patient might be exposed to other

possible sources contaminated by *Legionella* such as hotel or land based facilities and therefore, case investigation should identify other potential sources of infection.

In both circumstances, if the patient was on the ship during the likely incubation period, since the ship has been linked to a case, investigation of the vessel as the potential source should begin including sampling and appropriate environmental control measures.

Medical treatment

Medical treatment should be given based on the medical assessment results.

Microbiological diagnosis – specimen collection

See page 165, section 2.1.

Case investigation

Patients with pneumonia who are considered suspected cases of Legionnaires' disease should complete a case investigation questionnaire. Relatives may have to be asked if the patient is too ill to answer. An example of such a questionnaire is given in Annex 37. Case investigation is described in section 2.3, page 173.

2.2.2 Environmental measures

Environmental measures that should be immediately undertaken, when the ship is suspected as a possible source of contamination, include the following:

- Closing any facility thought to be a potential source of infection.
- Pre-disinfection sampling. Samples should be collected by a trained person from any likely sources that the patient was exposed to and be sent for analysis to a laboratory in collaboration with the competent authority at port. Sampling points should be selected based on risk assessment and other available information in the case of outbreak investigation. Points that are most likely to be the source of infection should be sampled.
- A preliminary risk assessment of the ships water systems to include temperature checking and comparison with any available schematic. This may identify additional areas that should be sampled.
- Disinfection (Annex 34, Annex 35).
- Audit of policies, systems and procedures for *Legionella* prevention.
- Review maintenance and monitoring regimes and records.
- Interview of key crew who are responsible for operation and maintenance of water systems and medical staff.
- Arranging a sampling schedule.
- Post disinfection sampling from points representing different loops of the water systems.

- Swab samples from fixtures and fittings of the recreational and decorative water facilities, cabin showers, taps and whirlpool baths (European Working Group Legionella Infections, 2005).

Water distribution system

Pre-disinfection water system sampling

A sample schedule should be immediately arranged to obtain representative samples from the water system. Samples and/or swabs should be collected from the hot and cold water system at the following locations: cabin taps and showers heads, beauty salon, hairdressers, communal showers, recreational water facilities, air conditioning systems and decorative water features. Sampling procedures are described in Annex 38.

Disinfection

Thermal or chemical disinfection should be conducted immediately after sampling. Annex 34 and Annex 35 describe thermal disinfection protocol and super-chlorination.

Recreational water facilities

Water sampling should include all recreational water facilities including hot tubs/spa pools. Samples should also be taken from the filter media.

If a recreational water facility is suspected as the source of infection, it should be immediately closed to the public. After pre-disinfection sampling, the facility should be drained, cleaned and disinfected. The pool and all other parts of the system including the balance tank should be drained, disinfected and then cleaned. The disinfection should be done with a solution containing 50 mg/L of free chlorine for 5 hours. All inside surfaces of the pool, the balance tank and filter housing should be cleaned; the jets should be removed and cleaned. The filter media should be changed. The pool should only be reopened to the public after microbiological testing has confirmed it is no longer contaminated with legionellae.

Air handling and conditioning systems

Samples should be collected from the condensation trays in air-conditioners and fan coils. After sampling they should be cleaned and disinfected.

Decorative fountains

Samples should be collected from the fountain pool, ballast tank and filter. After sampling, the system should be drained and disinfected and all parts of the system should be cleaned.

Following disinfection, water systems should be re-sampled and monitored for the presence of *Legionella*. Such samples should be collected a few days after the system has been disinfected to allow it to re-stabilise and ensure the disinfectant has been flushed out.

System re-assessment

The WSP or other *Legionella* control programme of the company and system schematics should be re-assessed and reviewed. Modifications to the construction of the water system might be needed and additional control measures may need to be implemented. Changes in the construction might be needed.

2.2.3 Measures to be taken before disembarkation

Reporting

MDH

For ships on international voyages, the MDH according to IHR should be completed and be sent to the competent authority if a case or suspected case of legionellosis has occurred on board. MDH should contain the number of people with pneumonia symptoms on board.

National requirements for reporting

Additional reporting may be required according to the national legislation applied in the port of call.

In the European Union, probable or confirmed cases must be reported to the port health/competent authorities (

Table **5**).

The competent authorities should be informed if any support is needed (clinical specimen examination, sampling, disinfection, hospitalisations) before the ship arrives at port.

2.2.4 After disembarkation measures

All necessary control measures such as disinfection, repairs, change of filter media and others should be taken to avoid the recurrence of an outbreak in the next voyage.

2.3 Port competent authority actions

Competent authorities in Europe follow guidelines and protocols according to the European Guidelines. The European Legionnaires' Disease Surveillance Network, ELDSNet, defines single cases and clusters of Legionnaires' disease as described below:

Single cases: Cases who in the ten days before onset of illness stayed at or visited an accommodation site that has not been associated with any other cases of Legionnaires' disease, or cases who stayed at an accommodation site linked to other cases of Legionnaires' disease but more than two years previously.

Clusters: Two or more cases who stayed at or visited the same accommodation site in the ten days before onset of illness and whose onset is within the same two-year period.

If a case or clusters of Legionnaires' disease among passenger or crew has been confirmed and one or more water facilities of the ship have been identified as the source of infection, then other

passengers and crew who have disembarked and have been exposed to the source of contamination should be contacted and asked if they have developed symptoms of Legionnaires' disease. The investigation should be undertaken by a competent authority. The ship crew should provide the competent authority with the necessary information upon request*.

* Rarely, cases are reported as travel associated even though the travel history is longer than 10 days (up to a maximum of 14 days) before onset of symptoms (it is known that a longer incubation period can sometimes be associated with underlying disease, especially immunosuppression and being of an elderly age).

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ANNEXES

Annex 1: Administrative issues – possible permanent implementation of the inspection programme

Participating authorities

In the permanent implementation competent authorities (e.g. port health authorities) from all EUMS and possibly even non-EU countries could participate.

Inspection team – competency and authorisation

The team could undergo update training on a regular basis. Frequent meetings of the inspection team or teleconferences are important to ensure consistency of inspections and standardisation of procedures, and to avoid subjective interpretation of the SHIPSAN manual requirements.

Newly authorised inspectors should participate in a minimum number and type of inspections together with competent and experienced authorised inspectors, before conducting inspections according to the SHIPSAN manual.

Auditing of the inspection activities of personnel may be needed.

Frequency of inspections

The principle of one inspection every 6 months could be maintained and eventually modulated according to previous inspection results.

Another option is to create categories of ships and specify the maximum frequency of inspections for each category. Another possibility could be to develop a target factor including different criteria such as previous inspection results and outbreak history, trip duration (more than 6 hours), food premises (type of food served: prepackaged food, ready to eat food, food preparation on board), accommodation provided on board etc. However, the criteria should be well justified and also evidence based.

Fees

During the permanent implementation, the sustainability of the programme will be at least partially achieved by fees charged to industry per ship inspection. The fees charged should be determined by the ship size (in gross tones). Fees will be used in order to cover the operating costs of the network. The inspection fee should be uniform across all EU countries, provided that all EU countries agree to one unique tariff. Clarification is needed as to whether fees are subjected to value added tax (VAT).

Revision and amendments

The manual will be revised at regular intervals as the evidence base increases and/or to take into account any new relevant guidance and legislation. The review should be conducted every 5 years, and amended as proposed by participating competent authorities (e.g. port health), the cruise and ferry industry and approved by the SHIPSAN partnership.

Publication of inspection results

During the permanent implementation, publication of inspection results will be in accordance with the Regulations (EC) No 178/2002, 852/2004 and 882/2004. Inspection results will be reported in a central database and may be published on the SHIPSAN website partially or fully after a specific time period. The corrective action report should be published together with the inspection report. A central database should be developed. Within the SHIPSAN database, it is recommended that all passenger ships sailing in the EU should be registered. The network communication procedure, which will be implemented through the web based SHIPSAN database, should be used in order to share the information as soon as possible after the inspection. For the protection of data confidentiality, please refer to paragraph iv (page 12).

Annex 2: Hygiene inspection guidelines

A list including the results of previous inspection and ship characteristics should be prepared before the inspection.

Once on board, inspectors should inform the designated crew that a SHIPSAN hygiene inspection will be conducted. An inspection should start with an introductory discussion with the designated crew on matters relating to hygiene systems and procedures applied on board.

Inspectors must wear appropriate clothing and PPE while carrying out an inspection on board, such as ear noise protection, jacket and hair covering, where necessary.

The inspector(s) must inspect all areas (medical facilities, cabins, galleys, pantry and food stores, swimming pools, spas, recreation facilities, potable water supplies, waste, toilets and facilities near the engine room, sewage treatment plant and ballast water tanks etc.), systems and services included in the SHIPSAN manual and verify the correct implementation of these systems and services and the hygiene conditions of areas inspected. There may be a need to carry out a more detailed visual and physical inspection of the ship. The inspector should typically look for risks arising from the activities on board the ship. Inspectors should explain the deficiencies identified and advise the crew on better practice as far as possible. Potential repeated deficiencies will be checked.

Inspection outlines will be used during the inspection. Inspectors should take contemporaneous notes on each deficiency identified as well as good practices observed.

Certificates and other logs and documents that are already carried on board and required by IHR and IMO, including the records of the prerequisite programmes according to HACCP may be reviewed, based on the findings of the inspection.

Manual measurements to be conducted include: free chlorine and pH in potable water and RWFs, temperatures of food, potable water, pools water, light intensity in food areas, water temperatures of warewashing machines etc. Calibrated thermometers and other devices should be used.

Environmental samples including food or water should be taken, if necessary. This will be decided by the inspectors.

Once the inspection is completed, the captain or other designated crew will be informed of the inspection findings, which will include deficiencies and good practices observed. Discussion could include consideration of previous inspection reports, consideration of relevant current documentation and identification of all food and water related issues identified on the ship. A draft report will be given to the captain including the inspection result. If there is insufficient time before the ship's scheduled departure to prepare a full draft report, this must be explained in the report and deficiencies included should be prioritised as far as possible. The final report will be sent to the ship within the following 15 days. An inspection report will be used as shown below:

INSPECTION REPORT

To download the word version of inspection report, please click: http://www.shipsan.eu/downl/Inspection_Report.doc

Ship Name	Inspection Date	Port of call	Time Inspection Started	Results Presented to
Company	No. Pax.	No. Crew	Time Inspection Completed	Inspector
				Trainer - Observer

***Introductory paragraph**: (describe briefly the satisfactory findings of the inspection and give an overall characterisation of the inspection result)*

……

……

A. Non compliance with requirements of the EU legislation

(The following items should describe any non compliance with requirements [RQ] of the Manual. If the inspection results do not include any non compliance with requirements this should be noted "NO deficiency with requirements of the Manual cited during the pilot inspection")

Item:	
Location:	
Non compliance with requirements of SHIPSAN TRAINET Manual	
Recommendation/Corrective action	
Timeframe to complete the corrective action	

B. Non compliance with recommended standards of the Manual

(The following items should describe any non compliance with recommended standards [ST] of the Manual)

Item:	
Location:	
Non compliance with recommended standards of SHIPSAN TRAINET Manual	
Recommendation/Corrective action	
Timeframe to complete the corrective action	

C. Notations

(The following items should describe any minor observations of little significance, or slight non compliances)

Item:	
Location:	
Notation	
Recommendation/Corrective action	
Timeframe to complete the corrective action	

Signature:	**Stamp:**

**This report describes the findings of the inspection which was based on the European Manual for Hygiene Standards and Communicable Diseases Surveillance on Passenger Ships. This Manual was produced by the EU SHIP SANITATION TRAINING NETWORK – SHIPSAN TRAINET PROJECT (2007206).*

Certificates, logs, records or other documentation that can be reviewed during inspection depending on the inspection findings

- SSCEC/SSCC under the IHR 2005
- Other certificates
- Medical log
- Food suppliers and contact details (purchase/orders, delivery/receipt)
- HACCP plan
- Training certificates
- Internal/external audit
- Menus of passengers and crew
- Recipe specifications
- Food temperature records (e.g. delivery, storage, cook, blast chilling, service)
- Free chlorine records for potable water
- Free chlorine records for swimming pools water
- Pest management records
- Microbiological water samples results records
- Cleaning schedules/plans (cleaning and sanitation plans for all passengers and crew areas including worthy spaces)
- Disinfection records for potable water system
- Disinfection records for pools
- Equipment maintenance
- Infection control plan
- Potable water cross connection control plan
- Calibration records
- Previous inspection reports

Annex 3: Record keeping and training for crew included in the manual

Chapter	Subject	Details	Duration on board/ashore
2. Communicable disease surveillance	GI questionnaire		12 months
	Case/outbreak recording form		
	GI or ILI recording form		
3. Food safety	HACCP records		12 months
	Training records		
	Deliveries records	Delivery details (date and time of delivery, officer in charge) and item details (expiry date and lot numbers or other details)	
	Calibration records		
	Temperature records		
4. Potable water safety	Parameters monitored on the ship		12 months
	Routine inspections and incident investigations outcome		
	Training programmes		
	Certifications	Materials, equipment, chemicals etc. on the ship	
	System assessment flow chart on the ship		
	Monitoring programme		
	A list of water treatment methods used on the ship	Disinfection, filtration, mineralisation etc.	
5. Recreational water safety	Water quality parameters	Date, time, test value of parameters	12 months
	Logs and charts		
	Backwash	Date, pressure indication before and after backwash time	
	Filter	Date, time, status	
	Filter media change	Date, time	
	Maintenance work	Date, time, process, type of equipment	
	Repair work	Date, time, description of problem and repair job	
	Thorough cleaning	Date	
	Accidental faecal or vomit release plan	Date, time of closure, remedial actions taken, time of opening	
	Water quality parameters out of limits	Date, time, parameter values, remedial actions taken	
	Injuries/deaths	Date, time, description of event and its reasons	
6. Pest management	Active and passive surveillance	Locations inspected, dates, time and names of inspectors	12 months
	Control measures applied	e.g. pesticides application	
	Results of follow up inspections		
	Training documents		
	List of the pesticides carried on board		
8. Hazardous substances	Material Safety Data Sheets		For as long as the substance is used on board

	Records of dangerous and/or inedible substances used on board		12 months
	Risk assessments		12 months
9. Waste management	Waste Declaration Document	As per Directive 2007/71/EC	At least until the next port of call
	Garbage Management Plan	Written procedures for collecting, storing, processing and disposing of garbage including equipment on board	N/A
	International Sewage Pollution Prevention Certificate		At all times (valid for 5 years max)
	Garbage Record Book	When garbage is discharged: (a) into the sea, (b) port reception facilities or other ships, (c) incinerated, (d) accidental or other exceptional discharge	2 years after the last entry is made on the record
	Waste Delivery Receipt (MEPC.1/Circ.645)	**(VOLUNTARY)** The designated representative of the reception facility provider should provide the waste delivery receipt form to the master of a ship that has just delivered waste.	This form should be retained on board the vessel along with the appropriate Oil Record Book, Cargo Record Book or Garbage RB for 2 years

Training of crew

Food safety	HACCP Personal hygiene and hygiene practices Crew health Food pathogenic microorganisms Cross contamination Cleaning, disinfection and maintenance of food preparation areas, utensils and equipment Time and temperature control of foods during purchasing, storage, handling, preparation and service
Potable water	WSP - monitoring procedures - control measures - operational limits - corrective actions
Recreational water safety	Management Plan for all RWFs: - Treatment Plan - Monitoring Plan - Cleaning Plan - Maintenance Plan - Emergency Plan
Pest management	IPM Plan Application methods of pesticides Knowledge of used pesticides
Housekeeping	Body fluid spillage policy Uniform policy Cleaning and disinfection of all accommodation and public spaces Nursery and play areas (pathogenic microorganisms, cross contamination, personal health and hygiene, hand washing and communicable disease symptoms) Hairdresser, beauty salons and gym (pathogenic microorganisms, cross contamination, personal health and hygiene, hand washing and communicable disease symptoms) Pet and animal housing areas (care of pets, infectious symptoms and cleaning and disinfection of kennels)
Hazardous substances	Health hazards Safe use of hazardous substances Handling of hazardous substances
Waste management/Ballast water management	Health risks involved in waste accumulation and spoilage Use of PPE Handling of medical wastes Ballast water management plan

Annex 4: Corrective action report

To download the word version of corrective action report, please click: http://www.shipsan.eu/downl/Corrective_action_report.doc

Ship Name	IMO number	Port and date conducted the pilot inspection

The following actions have been taken to correct each of the non-compliance noted during the inspection

A. Non compliance with requirements of the EU legislation

(The following items should describe any non compliance with requirements [RQ] of the Manual. If the inspection results do not include any non compliance with requirements this should be noted "NO deficiency with requirements of the Manual cited during the pilot inspection")

Number of Inspection Report item:	
Non compliance with requirement of SHIPSAN TRAINET Manual	
Corrective action taken	

B. Non compliance with recommended standards of the Manual

(The following items should describe any non compliance with recommended standards [ST] of the Manual)

Number of Inspection Report item:	
Non compliance with recommended standard of SHIPSAN TRAINET Manual	
Corrective action taken	

C. Notations

(The following items should describe any minor observations of little significance, or slight non compliances)

Number of Inspection Report item:	
Non compliance with recommended standard of SHIPSAN TRAINET Manual	
Corrective action taken	

Signature:

Annex 5: Recommended medical facilities, medication and medical staff competency for passenger ships making international voyages

TYPE OF SHIP	Duration of voyage					
	13 to 36 hours		36 to 72 hours		More than 72 hours	
	Service	Personnel	Service	Personnel	Service	Personnel
Passenger ferry group 1 (PFG1) = <500 crew and pax	**BMF**** (Basic Medical Facility)		**CMF*** (Complete Medical Facility)	**1 RN***	**CMF****	**1 DR****
	BPH** (Basic Pharmacy)		**CPH*** (Complete Pharmacy)		**CPH****	**1 RN****
Passenger ferry group 2 (PFG2) = 500 to 1500 crew and pax	**BMF****	**1 RN***	**CMF***	**1 RN****	**CMF****	**1 DR****
	BPH*		**CPH***		**CPH****	**2 RN****
Passenger ferry group 3 (PFG3) = 1500 to 2500 crew and pax	**CMF****	**1 RN***	**CMF****	**1 DR****	**CMF****	**1 DR****
	CPH**		**CPH****		**CPH****	**3 RN****
Passenger ferry group 4 (PFG4) = 2500 to 4000 crew and pax	**CMF****	**1 RN****	**CMF****	**1 DR****	**CMF****	**2 DR****
	CPH**		**CPH****	**1 RN****	**CPH****	**3 RN****
Passenger ferry group 5 (PFG5) = more than 4000 crew and pax	**CMF****	**1 DR****	**CMF****	**1 DR****	**CMF****	**1 DR**** Per 1500 c/p
	CPH**	**1 RN****	**CPH****	**1 RN****	**CPH****	**1 RN**** Per 1000 c/p
Cruise ship group 1 (CSG1) = <500 crew and pax	**BMF****		**CMF***	**1 RN***	**CMF****	**1 DR****
	BPH**		**CPH***		**CPH****	**1 RN****
Cruise ship group 2 (CSG2) = 500 to 1500 crew and pax	**BMF****	**1 RN***	**CMF***	**1 RN****	**CMF****	**1 DR****
	BPH**		**CPH***		**CPH****	**2 RN****
Cruise ship group 3 (CSG3) = 1500 to 2500 crew and pax	**CMF****	**1 RN***	**CMF****	**1 DR****	**CMF****	**1 DR****
	CPH**		**CPH****		**CPH****	**3 RN****
Cruise ship group 4 (CSG4) = 2500 to 4000 crew and pax	**CMF****	**1 RN****	**CMF****	**1 DR****	**CMF****	**2 DR****
	CPH**		**CPH****	**1 RN****	**CPH****	**3 RN****
Cruise ship group 5 (CSG5) = more than 4000 crew and pax	**CMF****	**1 DR****	**CMF****	**1 DR****	**CMF****	**1 DR**** Per 1500 c/p
	CPH**	**1 RN****	**CPH****	**1 RN****	**CPH****	**1 RN**** Per 1000 c/p

Doctor (DR) **Recommended***
Nurse (RN) **Minimum standard****

Medical staff competency

Medical staff (physicians and registered nurses) should have competency and the following qualifications:

- Current physician or registered nurse license
- Three years of post-graduate/post-registration clinical practice in general and emergency medicine

or

- Board certification in emergency medicine or general medicine/family practice or internal medicine
- Competent skill level in advanced life support and cardiac care
- Competent skill level in minor surgery (e.g. suturing etc.)
- Fluency in the official language of the cruise/ferry line, the ship and that of most passengers
- Familiarity with hazardous substances used on board and management of any medical condition linked to their use/manipulation.

Medication

Medical facilities should have emergency medications and supplies for management of common medical emergencies such as:

- gastrointestinal system medications;
- cardiovascular system medications;
- respiratory system medications;
- infectious disease medications;
- eye medications;
- ear, nose and oropharynx (throat) medications;
- skin disease medications.

Medical Plan

Passenger ship medical facilities should include:

- A contingency Medical Plan defining:
    - One or more locations on the ship that could be used as a medical facility and should:
        - be in a different fire zone;
        - be easily accessible;
        - have lighting and power supply on the emergency system.
    - Crew members assigned to assist the medical team as appropriate to the level of the contingency.

Annex 6: Surveillance of communicable diseases on board ships

Collection of surveillance data by competent authorities from passenger ships sailing in European waters can improve the evidence base for hygiene standards enforced to control and prevent communicable diseases and outbreaks on passenger ships. This can aid shipping companies in strategic planning for the prevention of communicable diseases on their ships. It can also be of benefit to port health authorities when assessing the risks from communicable diseases and public health events for each ship and in evaluating preventive actions. Finally, the surveillance data can help to assess the application of EU and international systems on early detection and response (EWRS, IHR) and to assist in contact tracing.

Surveillance based on collection of data at the ship infirmary, using standard clinical syndrome definitions, is the most appropriate method to identify outbreaks on board ships, since it is difficult to obtain reliable and timely laboratory results to confirm a diagnosis.

Annex 7: Gastrointestinal illness log (recommended log)

The log included below may be used for recording and reporting cases and outbreaks of acute gastroenteritis. This may be useful for passenger shipping companies or ships which have no designated recording and reporting formats.

Ship name:		Voyage number:		Dates	From:	__/__/__	To:	__/__/__	Page:		of	
Total number of passengers on board:		Total number of ill passengers:		Total number of crew on board:					Total number of ill crew:			

Visit date (mm/dd/yy)	Name (Last, First)	Unique Number Identifier*	Age	M/F	Pax/Crew	Cabin No.	Date on ship (mm/dd/yy)	Date off ship (mm/dd/yy)	Pax Meal Seat /Crew Pos.	Illness Onset		Diarrhoea		Vomiting	Fever		Abd. cramps	Headache	Myalgia	Stool specimens		Antidiarrhoeal medications (Y/N)	Reportable case to authorities (Y/N)	Underlying illness (specify)
										Date	Time	Y/N	Blood Y/N	Y/N	Y/N	°C/°F	Y/N	Y/N	Y/N	Requested Y/N	Received Y/N			

*This number rather than the name may be reported to competent authority to protect patient confidentiality.

Annex 8: Influenza-like illness log (recommended log)

This log is designed for possible use by passenger shipping companies and ships with no designated recording and reporting systems for ILI.

Ship name:		Voyage number:		Dates	From:	__/__/__	To:	__/__/__	Page:		of	
Total number of passengers on board:		Total number of ill passengers:		Total number of crew on board:					Total number of ill crew:			

Visit date (mm/dd/yy)	Name (Last, First)	Unique Number Identifier**	Date on ship (mm/dd/yy)	Date off ship (mm/dd/yy)	Age	M/F	Pax/Crew	Cabin No.	CREW: country where hired	Pax Meal Seat /Crew Pos.	Illness Onset		Cough	Malaise	Fever		Shore throat	Shortness of breath	Headache	Coryza	Myalgia	Rapid Flu Test	CXR	Flu Vaccine During Past Year	Flu Vaccine Date	Medications (Y/N)	Reportable case to authorities (Y/N)	Reportable case Specify (Case Under Investigation /Propable /Confirmed)	Underlying illness	Complications
											Date	Time	Y/N	Y/N	Y/N	°C/F	Y/N	Y/N	Y/N	Y/N	Y/N	ND/P/N*	ND/P/N*	Y/N/U	(mm/dd/yy)					

*ND = test Not Done, P=Positive test result or +CXR infiltrates, N=Negative test result or +CXR infiltrates, U=Unknown
**This number rather than the name may be reported to competent authority to protect patient confidentiality

Annex 9: Gastrointestinal illness questionnaire

Ship name:			Voyage No.:	Date:
Last name:			First name:	
Date of Birth:	Date joined the cruise:		Age (in years):	Sex M/F
Cabin number:			Total number of people in cabin:	
Dining seating:			Dining table number:	
Symptoms started date:			Time: (hh:mm)	AM/PM
Do you know other people ill with the same symptoms?				Yes/No
If yes, please list their names:				
Did you stay overnight or longer in a boarding city before you joined the ship?				Yes/No
If yes, where?	City:	State:	Country:	
Was the overnight stay in a hotel/motel/commercial residence?				Yes/No
If yes, what was the name and address of the hotel, motel/commercial residence: Name: Address: Town: Country:				
How did you travel to the city where you boarded the ship for this cruise? Select all that apply.				
[ ] Airplane	Airlines:		Flight No.:	
[ ] Automobile				
[ ] Bus/Motorcoach				
[ ] Train				
[ ] Other	Please specify:			
Are you a member of a tour group?				Yes/No
Prior to boarding the ship, did you participate in a pre-embarkation tour/package?				Yes/No
If yes, which tour(s)/package(s) did you participate in? (list all)				
Prior you got your illness, did you go ashore at any of the ports of call?				Yes/No
If yes, please list the ports of call where you went ashore				
Did you participate in any shore excursions at any port of call?				Yes/No
If yes, which shore excursions did you participate in? (list all)				
Did you eat anything while you were ashore at any port of call?				Yes/No
If Yes, please give details of the place and list all foods consumed ashore:				
Did you drink anything (including drinks with ice) while ashore at any port of call?				Yes/No
If Yes, please give details of the place and list all beverages consumed ashore:				
What did you think is the cause of your illness?				

Last Name:		First Name:					
Meals and activities on board vessel prior to illness Please list the specific vessel locations of the meals you consumed and the vessel activities you participated in before you became ill							
Day of illness onset Give Date: .../.../...		**Day before illness onset**		**Two days before illness onset**		**Three days before illness onset**	
Breakfast Place: ..... Time: ..... Items eaten/ drunk		**Breakfast** Place: ..... Time: ..... Items eaten/ drunk		**Breakfast** Place: ..... Time: ..... Items eaten/ drunk		**Breakfast** Place: ..... Time: ..... Items eaten/ drunk	
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
Lunch Place: ..... Time: ..... Items eaten/ drunk		**Lunch** Place: ..... Time: ..... Items eaten/ drunk		**Lunch** Place: ..... Time: ..... Items eaten/ drunk		**Lunch** Place: ..... Time: ..... Items eaten/ drunk	
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
Dinner Place: ..... Time: ..... Items eaten/ drunk		**Dinner** Place: ..... Time: ..... Items eaten/ drunk		**Dinner** Place: ..... Time: ..... Items eaten/ drunk		**Dinner** Place: ..... Time: ..... Items eaten/ drunk	
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
Snack Place: ..... Time: ..... Items eaten/ drunk		**Snack** Place: ..... Time: ..... Items eaten/ drunk		**Snack** Place: ..... Time: ..... Items eaten/ drunk		**Snack** Place: ..... Time: ..... Items eaten/ drunk	
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
Activities		**Activities**		**Activities**		**Activities**	
AM	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....

Annex 10: Case/Outbreak recording form

To download the word version, please click: http://www.shipsan.eu/downl/Case_Outbreak_Recording_Form.doc

EU Ship Sanitation Training Network (No 2007206) EC DG SANCO

Case* / Outbreak† Recording Form (S2)

This form should be completed by the designated crew of the ship. Only severe cases of Gastrointestinal Illness (GI) or Influenza Like Illness (ILI) should be recorded on this form. This form should be completed for one case only

Code*: ☐

*generated by web-based tool

Date: .../../.... Time: ..:..

Please choose one: ☐ **Case Recording (Fill in except part 3)** ☐ **Outbreak Recording (Fill in except part 2)**

Report type:
☐ **Initial (when case/outbreak declared)**
☐ **Update (cumulative total at next port of call)**
☐ **Final (when the outbreak finished)**

1) Report as early as possible.
2) For outbreaks please send report as soon as possible and less than 24 hours before the next port of call.
3) For updates less than 4 hours before the next port of call.

Part 1. **Cruise / travel data**

1.1. **1.1.1.Ship name: ..... 1.1.2.IMO Number :.....**

1.2. **Voyage identification code: .....**

1.3. **Cruise/travel/voyage length (days): .....**

1.4. **1.4.1.Embarkation port: .....1.4.2.Embarkation date: ..../..../.....**

1.5. **1.5.1.End of cruise/voyage port: .....1.5.2. End of cruise/voyage date: ..../.../.....**

1.6. **1.6.1.Next arrival port: .....1.6.2.Next port arrival date: ..../..../.....**

1.7. **Itinerary of the cruise/travel/voyage (all ports to be visited during the current cruise/travel/voyage):**
Port1 Port2 Port3

Port4 Port5 Port6 $Port_n$.....

1.8. **Number of passengers aboard, at the time of reporting: .....**

1.9. **Number of crew members aboard: .....**

---

* **Case:** Any person who has died (otherwise than as a result of accident, regardless of cause) on board or any person with a reportable illness as listed in Annex A of the case/outbreak recording form or a person with fever (≥38°C, 100°F) and symptoms as listed in Annex B of the case/outbreak recording form.

† **Outbreak definition**: The occurrence of cases of disease with a frequency in excess of what would normally be expected (for the specific itinerary and time). Normal expectancy is determined from historical/baseline data for the ship. A single case of a communicable disease long absent from a population, or caused by an agent (e.g. bacterium or virus) not previously recognised in that community or area, or the emergence of a previously unknown disease, may constitute an alert for a possible outbreak and should be reported.

Outbreak definition for GI: An increase in the number of cases of GI above the number normally occurring in that ship over a defined period of time and itinerary. two different thresholds should be used. An initial report should be prepared and sent to the competent authority at ports, when the percentage of reportable gastroenteritis cases reaches 2% or more among passengers or 2% or more among crew. A second report should be sent when the number of reportable gastroenteritis cases reaches 3% or more among passengers or 3% or more among crew.

Outbreak definition for ILI: An increase in the number of cases of ILI above the number normally occurring in that ship over a defined period of time and itinerary.

Please complete either Part2 or Part3 but always Part4.

Part 2. Case occurrence

2.1. 2.1.1.Has this case died on board during the voyage otherwise than as a result of accident?
☐Yes ☐No
2.1.2.If yes suspected cause of death:.....

2.2. 2.2.1.Has this case developed **fever** and one or more of the symptoms and signs in ANNEX B?
☐Yes ☐No

If yes please report the symptoms and signs:

2.2.1.1.☐Shortness of breath	2.2.1.5.☐Skin rash	2.2.1.9. ☐Persistent cough
2.2.1.2 ☐Decreasing level of consciousness	2.2.1.6.☐Unusual bleeding	2.2.1.10. ☐Swollen glands
2.2.1.3.☐Recent weakness or paralysis	2.2.1.7.☐Severe vomiting	2.2.1.11. ☐Severe diarrhoea
2.2.1.4.☐Jaundice	2.2.1.8 ☐Recurrent convulsion	

2.2.2.Do you suspect that this case has an illness listed in ANNEX A? ☐Yes ☐No
2.2.3.What is the possible diagnosis?.....

2.3. Date of beginning of symptoms: …./…./……

2.4. Country of residence: ..... 2.6 Port of disembarking: .....

2.7. Age:..... 2.8. Sex: ..... 2.9. Hospitalized: ☐Yes ☐No

Part 3. Outbreak occurrence

3.1. 3.1.1.What type of outbreak is occurring: ☐ Gastrointestinal viral ☐ Gastrointestinal bacterial
☐ Respiratory ☐ Other: 3.1.2.Please specify: .....

3.2. Please specify possible diagnosis: .....

3.3. Date of the beginning of the reported outbreak: …./…./……

3.4. Total number of ill passengers aboard since the beginning of the outbreak: .....

3.5. Total number of ill crew members aboard since the beginning of the outbreak: .....

3.6. Number of passengers admitted to hospital ashore: .....

3.7. Number of crew members admitted to hospital ashore: .....

3.8. Number of deaths‡ since the beginning of the outbreak: .....

Part 4. Management of case or outbreak

4.1. What is the possible source of the case or the outbreak?

.....

.....

4.2. What control measures have been taken aboard or are planned: e.g. isolation, advice, contact tracing, medication given:

.....

.....

4.3. 4.3.1. Has any laboratory or diagnostic test been carried out on board?: ☐Yes ☐No
4.3.2. If yes provide the results: .....
4.3.3. Is there any ashore laboratory confirmation? ☐Yes ☐No
4.3.4. If yes provide the results: .....

4.4. 4.4.1. Is any port health support needed for investigation and/or preventive action?: ☐Yes ☐No
4.4.2. If yes, please specify: .....

4.5. Ship's duty officer's contact details, including telephone number: .....

‡ Otherwise than as a result of accident, regardless of cause

ANNEX A (List of communicable diseases)

- Acquired immunodeficiency syndrome (AIDS) and human immunodeficiency virus (HIV) infection
- Anthrax
- Avian influenza A/H5 or A/H5N1 in humans
- Botulism
- Brucellosis
- Campylobacteriosis
- Chlamydia infection
- Cholera
- Cryptosporidiosis
- Diphtheria
- Echinococcosis
- Giardiasis
- Gonorrhoea
- Haemophilus meningitis, invasive disease
- Hepatitis A
- Hepatitis B, acute
- Hepatitis C
- Influenza including influenza A(H1N1)
- Legionnaires' disease
- Leptospirosis
- Listeriosis
- Malaria
- Measles
- Meningoccocal invasive disease,
- Mumps
- Pertussis
- Plague
- Pneumococcal invasive diseases
- Poliomyelitis
- Q fever
- Rabies
- Rubella
- Rubella, congenital
- Salmonellosis
- Severe acute respiratory syndrome (SARS)
- Shiga/vero toxin producing Escherichia coli infection (STEC/VTEC)
- Shigellosis
- Smallpox
- Syphilis
- Syphilis congenital and neonatal
- Tetanus
- Toxoplasmosis, congenital
- Trichinellosis
- Tuberculosis
- Tularaemia
- Typhoid/paratyphoid fever
- Viral haemorrhagic fevers
- West Nile fever
- Yellow fever
- Yersiniosis

In addition, pneumonia when confirmed by x-ray

The case definitions of the above diseases are included in the Commission Decisions 2008/426/EC of 28 April 2008 and 2009/539/EC of 10 July 2009, amending Decision 2002/253/EC
HTTP://EC.EUROPA.EU/HEALTH/PH_THREATS/COM/DOCS/1589_2008_EN.PDF

ANNEX B (Signs and Symptoms)

○ Fever -	a measured temperature of 38°C [100°F] or greater.
○ Shortness of breath -	gasping for air, unable to catch his or her breath; breathing too fast and shallow to get enough air.
○ Skin rash -	presence on skin of multiple red bumps; red, flat spots; or blister-like bumps filled with fluid or pus that are intact or partly crusted over. Rashes may be discrete, may run together, and may include one or more areas of the body.
○ Persistent cough –	a cough that is either frequent or severe enough to catch the attention of others on board the ship or a severe cough that lasts three weeks or more.
○ Decreased level of consciousness -	condition of an ill person when he or she is not fully aware of what is going on around himself or herself, may appear confused, or may be unusually difficult to awaken. An ill person with decreased consciousness may not know the date or their name.
○ Unusual bleeding –	noticeable and unusual bruising or bleeding from the gums, ears, and nose or on areas of skin for which there is no obvious explanation.
○ Swollen glands -	enlargements of glands located in the head, neck, or groin, notably of salivary or parotid glands or lymph nodes.
○ Recent weakness and paralysis -	new or recently occurring weakness or partial or complete inability to move the arms, legs, or the muscles used for swallowing or breathing.
○ Severe vomiting -	vomiting accompanied by signs of dehydration*.
○ Severe diarrhoea -	diarrhoea accompanied by signs of dehydration*. ***Dehydration: signs of** – dry mouth, skin, or lips; Weakness or light-headedness particularly when standing; tenting of skin or loss of turgor so that skin may shrivel and wrinkle; production of less urine; or abnormally dark urine.
○ Jaundice -	yellowish discoloration of skin, eyes, and/or other bodily tissues or fluids.
○ Recurrent convulsion -	an intense, paroxysmal, involuntary muscular contraction or a series of such contractions.

Annex 11: Communicable diseases surveillance routine recording form

To download the word version, please click: http://www.shipsan.eu/downl/Communicable_diseases_routine_recording_Form.doc

EU Ship Sanitation Training Network (No 2007206)
EC DG SANCO

Communicable Diseases Surveillance Routine Recording Form (S1)

This form should be completed by the designated crew of the ship at the end of the day

Date .../.../.... *Time:* ...:...

1.1. **1.1.1Ship name:** .....**1.1.2.IMO Number:** .....

1.2. **1.2.1. Voyage or cruise identification code:** ..... **1.2.2.Cruise/travel/voyage length (days):** ....

1.3. **1.3.1. Embarkation port:** ..... **1.3.2. Embarkation date:** .../.../...

1.4. **1.4.1. End of cruise/voyage port:** ..... **1.4.2. End of cruise/voyage date:** .../.../...

1.5. **Itinerary of the cruise/ferry route (all ports to be visited during the current cruise/ ferry route):**
Port1: ..... **Port2:** ..... **Port3:** .....
Port4: ..... **Port5:** ..... **Port6:** .....

1.6. **Number of crew members aboard:** .....

1.7. **Number of ill passengers and crew members aboard who meet the reportable Gastrointestinal Illness (GI) and Influenza Like Illness (ILI) case definition(s).**

Days of cruise/voyage

Days	Passengers				Total number of passengers on board	Crew			
	GI (new cases daily)	GI Cum.%	ILI (new cases daily)	ILI Cum.%		GI (new cases daily)	GI Cum.%	ILI (new cases daily)	ILI Cum.%
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

1.8. **Number of deaths related to GI:** .....
1.9. **Number of deaths related to ILI:** .....

Definitions

- **Gastrointestinal Illness (GI):** *- according to USA Vessel Sanitation Program (VSP)*
  Acute diarrhoea (three or more episodes of loose stools in a 24 hour period);
  or
  Vomiting and at least one of the following symptoms:
  - One or more episodes of loose stools in a 24 hour period
  - abdominal cramps
  - headache
  - muscle aches
  - fever ≥38°C (100°F)

- **Influenza Like Illness (ILI):** *- according to World Health Organization (WHO)*
  A person with sudden onset of fever of >38°C (100°F) and cough or sore throat in the absence of other diagnoses.

Annex 12: Identification of physical, chemical and microbiological hazards for food

Type of hazard	Description of hazards
Physical hazards	• This category includes foreign bodies and material which may contaminate food. • Examples of physical hazards include glass, plastic, wood, metal, insects and hair.
Chemical hazards	• This category includes a wide variety of chemical residues. Chemical hazards may occur following use of chemicals in food production and processing, or cleaning, disinfection and pest control. • These chemical residues can be manmade or naturally occurring substances. • Examples include allergens, food additives, pesticides and cleaning products.
Microbiological hazards	• Biological hazards can be bacterial (*Escherichia coli* O157:H7, *Listeria monocytogenes*, *Staphylococcus aureus*, *Salmonella* spp., *Clostridium botulinum*, *Vibrio parahaemolyticus*, etc.), fungal (*Penicillium* spp., *Aspergillus* spp., *Fusarium* spp., aflatoxins etc.), viral (norovirus, hepatitis A, other enteric viruses etc.) or parasites (*Giardia* spp., *Cryptosporidium* spp., *Taenia* spp., *Trichinella* sp., etc.). • These microorganisms may be present in food when it arrives on board, or food may be contaminated once on board the ship and given the right conditions, may multiply to harmful levels.

Annex 13: Model training plan

Category A: Refers to "low risk food handlers". Crew working in support of the food operation, or whose activities do not directly involve preparation and handling of high risk or open unwrapped foods.
Category B: Refers to "high risk food handlers". Crew directly involved with the preparation and cooking of foods, particularly those of a high risk nature.
Category C: Refers to supervisors and managers. Officers and supervisors directly involved with preparation and cooking of food or those in a catering management position.

Training stages

This training should be divided into three stages (1, 2 and 3) as summarised below.

Frequency of training

All food handlers:

- before starting work for the first time, should receive written, verbal or electronic instruction in the essentials of food hygiene (stage 1).

Awareness instructions

- thereafter, should receive appropriate hygiene awareness instruction:
  - before starting work for training stage 1, within 4 weeks of employment or 8 weeks for part time crew for training stage 2 and within 3 months for training stages 3 (Level 1);
  - training stage 3 (level 2 and/or 3), if required according to responsibilities, should be received in a timely manner;
- should be able to demonstrate their food hygiene knowledge.

The training of food handlers should be updated according to needs.

Food handlers category	**Stage 1** ***Essentials of food hygiene***	**Stage 2** ***Hygiene awareness instruction***	**Stage 3** ***Level 1***	***Level 2 and/or 3***
Category A	Before starting work for the first time	Within 4 weeks of employment or 8 weeks in part time crew	--	--
Category B	Before starting work for the first time	Within 4 weeks of employment or 8 weeks in part time crew	Within 3 months	--
Category C	Before starting work for the first time	Within 4 weeks of employment or 8 weeks for part time crew	Within 3 months	Good Practice according to responsibilities

Category A food handlers

Food handler category A

- This category includes handlers of "low risk food" or "wrapped food".

- These food handlers must complete **stage 1** and **stage 2**.

Training content stage1

Training stage 1

(This stage is for "low risk food handlers")

- Essentials of food hygiene.

Food handlers must:

- Ensure that they are clean and wear clean clothing.
- Ensure their hair and beards are trimmed and fully covered.
- Always wash their hands thoroughly before starting work, before handling food, after using the lavatory, after handling raw foods (which requires cooking or other process) or waste, after every break, after blowing their nose, eating, drinking or smoking.
- Inform their supervisor, before commencing work, of any skin, nose, throat, stomach or bowel trouble, fever or infected wound.
- Ensure cuts and sores are covered with a waterproof, high visibility dressing.
- Avoid unnecessary handling of food items.
- Not smoke, eat or drink in a food room, and never cough or sneeze over food or food preparation surfaces and equipment.
- Inform their supervisor if they see something wrong, which could affect food safety.
- Not prepare food too far in advance of service.
- Keep perishable food either refrigerated or hot.
- Make sure that they keep the preparation of raw (which requires cooking or other process) and ready to eat food strictly separate.
- Ensure that all equipment and surfaces are kept clean at all times.
- When reheating food, ensure it gets sufficiently hot throughout (reheating can be carried out only once).
- Follow all food safety instructions in the ships operational manuals, on food packaging and from their supervisor.

Training content stage 2

Training stage 2

(This stage is for "low risk food handlers")

- The ship food operators'/business's policy – priority given to food hygiene and safety.
- Personal health and hygiene – the need for high standards, reporting of illness, rules on smoking.
- Food contaminants - physical, chemical and microbiological.
- Pathogenic microorganisms.
- Cross contamination – causes and prevention.
- Food storage – protection and temperature control.
- Waste disposal.
- Cleaning and disinfection – materials, methods and storage.
- Awareness of pests, actions to prevent and control pests.
- Reporting to supervisor of signs or actual presence of pests identified.

Category B food handlers

Food handler category B

- This category includes handlers of "high risk food" or "unwrapped food".
- These food handlers should be trained according to **stage 3 (Level 1)**.

Training content stage 3 (Level 1)

Training stage 3 (Level 1)

(This stage is for "high risk food handlers")

- Content of training **stage 1** and **stage 2**.

and

Stage 3 (Level 1)

- Foodborne diseases, symptoms and causes.
- Food poisoning microorganisms types and sources.
- Basic microbiology, toxins, spores, growth and destruction.
- Premises and equipment.
- Relevant legal obligations.
- Effective temperature control of food (storage, thawing, cooking, cooling, hot and cold holding and reheating).
- Preventing food contamination and spoilage.
- Cleaning, disinfection and sterilisation.

Food handler category C

Category C food handlers

- This category includes managers or supervisors who handle any type of food, or who have control of food handlers.
- The supervisors and managers should be trained according to stage 3 (Level 2 and/or 3).

Training content Stage 3 (Level 2 and 3)

Training stage 3 (Level 2 and/or 3)

(This stage is for "supervisors" and "managers")

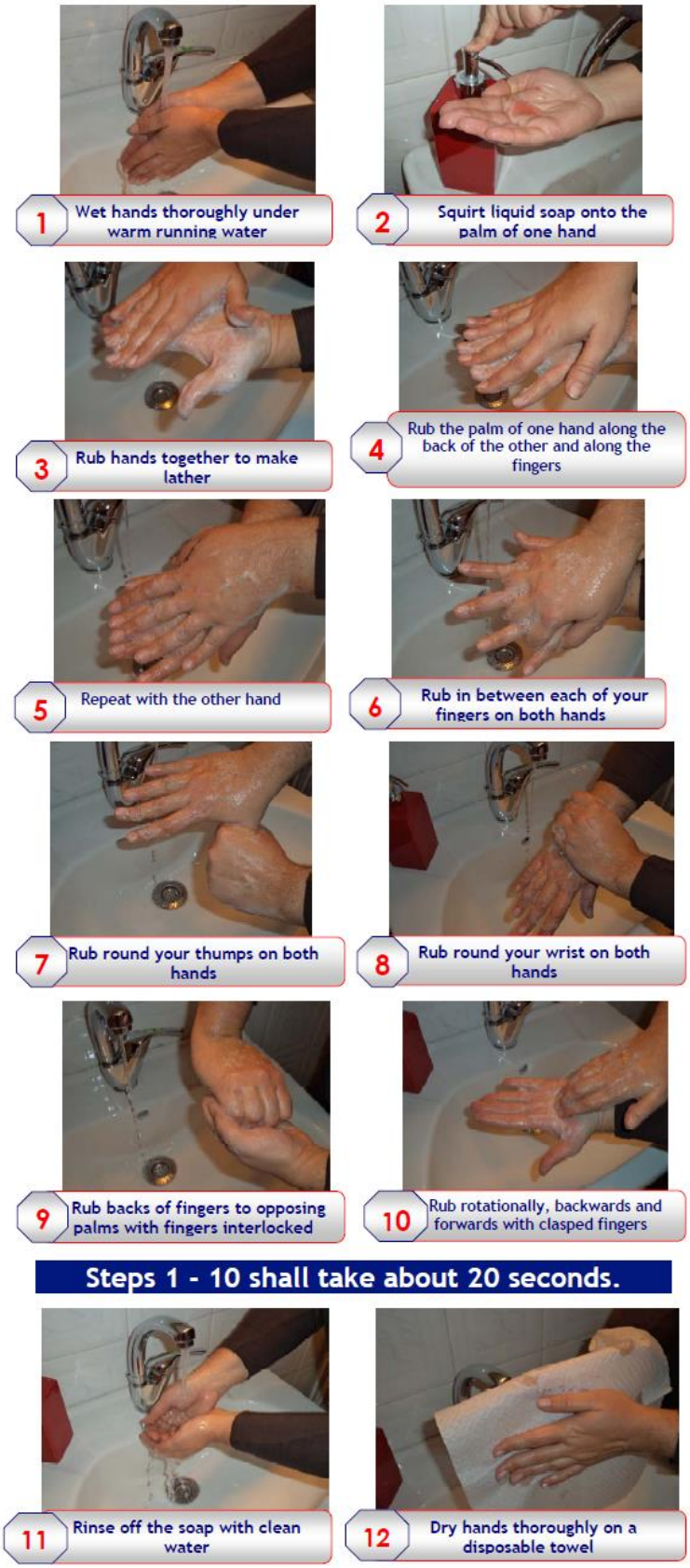
- Content of training **stage 1**, **stage 2** and **stage 3 (Level 1)** and **Level 2 and/or 3**
- Implementation of HACCP principles.
- Effective supervision of food handlers with regard to all hygiene and food safety issues.
- Carrying out food hygiene inspections and audits.
- Assisting in the development, application and review of hazard analysis and HACCP principles implementation.
- Providing guidance and advice on the management of food hygiene in the passenger ship food operations.
- Technical knowledge necessary for management of complex food production processes.
- Designing an improvement plan based on process quality management principles.

Duration of Level 2 and Level 3

- The duration of training Level 2 should be from 12 to 24 hours.
- The duration of training Level 3 should be from 24 to 40 hours.

Annex 14: Hand washing method

To download the hand washing method click on the following link: http://www.shipsan.eu/downl/Handwashing_guide.pdf



Annex 15: Guidance on production and use of WSPs

Introduction to WSP

The management of potable water on ships should cover design, construction, commissioning, operation, monitoring and maintenance, in order to ensure that there are hygienic safeguards for the whole water supply process. The WHO has developed a HACCP like system for drinking water called a WSP and SHIPSAN has adopted this approach for managing potable water quality on passenger ships.

Definition

A WSP is a comprehensive risk assessment and risk management approach that encompasses all steps in water supply from source to consumer in order to ensure the safety of potable water (World Health Organization, 2004).

Purpose

The WSP approach has been developed to organise and systematise practices applied to potable water and ensure the applicability of these practices to the management of potable water quality. All ships should have a WSP in order to ensure the quality of potable water that reaches consumers.

Although many water suppliers provide potable water of adequate quality without using a WSP, the adoption and implementation of its procedures have the following benefits:

- it provides a systematic, detailed and prioritised assessment of potential hazards;
- it ensures operational monitoring of control measures;
- it provides an organised and structured system to minimise the likelihood of failures;
- it is a dynamic approach that can lead to future improvements in the water supply management;
- it assists competent authorities in conducting inspections.

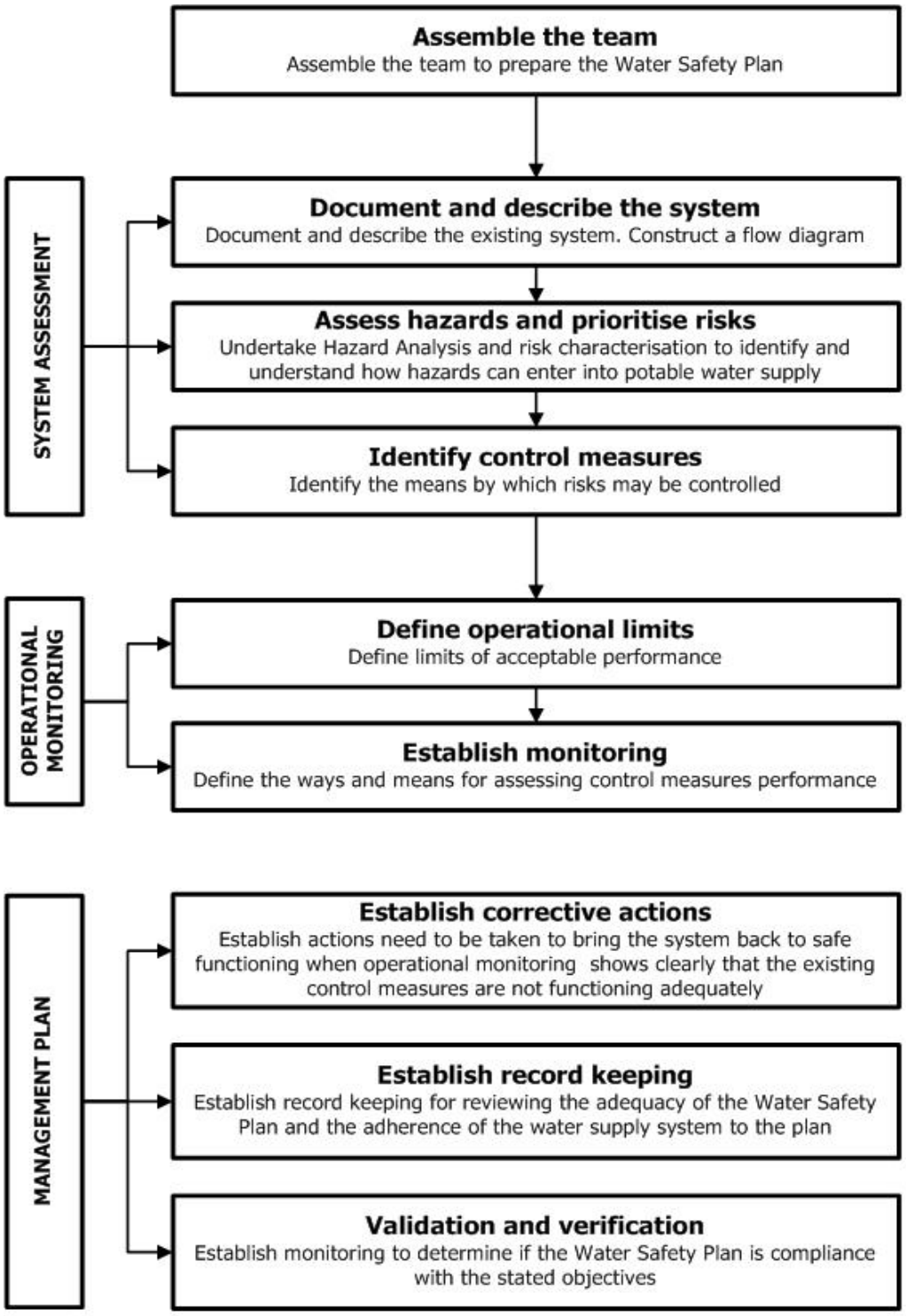


Figure 1. Overview of key steps in developing a WSP

WSP Components (principles)

The WSP approach adopts many of the principles of other risk assessment approaches such as HACCP and the multi-barrier approach (hurdle technology). The basic elements of a WSP are outlined below and in Figure 1.

System assessment: This fully describes the water supply process, identifies the possible hazards and hazardous events, prioritises control of risks and records the control measures applied for the prevention of consequences. The scope of the system assessment is wide enough to ensure that sufficient control measures are put in place to ensure all water safety health based targets are met. Table 9 includes an example of the system assessment of a ship water system.
Operational monitoring: This helps evaluate the performance of each control measure identified and also involves reporting any deviations from the operational limits.
Management Plan: This sets out the corrective actions to be taken when operational monitoring indicates deviations from operational limits. It also includes the measures taken for record keeping, verification monitoring and incident investigation.

Risk characterisation

All identified hazardous events must then be considered and prioritised bearing in mind two criteria, the probability that it will occur (likelihood) and the likely consequences (Table 8).

Table 8: Typical significance scale

	Consequences		
Likelihood	Minor 1	Moderate 2	Major 3
A (likely)	M	H	H
B (moderate)	L	M	H
C (unlikely)	L	L	M

H: High risk, M: Moderate risk, L: Low risk

Table 9: Examples of the system assessment procedure for the ship potable water system

This is not a complete system assessment procedure, but for illustration only and should not be used. Each ship should do their own assessment.

PROCEDURE	Possible hazardous event	Likelihood	Consequences	Control measures	Operational limits	Operational monitoring	Corrective actions	Record keeping
SOURCE WATER	Source contaminated with microbiological hazards	C Unlikely	3 Major	1. Check the water quality reports and certifications from the supplier before loading 2. Continuous chlorination at the time of bunkering	1. Absence of microbiological hazards in the collected reports 2. Chlorine residual no less than 2 mg/L	Measurement of disinfectant residual	Filtration and disinfection or use of an alternative source	All water quality reports should be kept on the ships records for 12 months. Free chlorine measurement records should be kept on the ships records for 12 months.
BUNKERING	Filling hose contamination	B Moderate	2 Moderate	Routine cleaning and disinfection Proper storage and labelling Handlers training	No defections detected during inspection	Routine inspections	Cleaning and disinfection Repair or replace	Inspection records Repair records Cleaning and disinfection records
STORAGE	Corrosion of storage tanks	A Likely	1 Minor	Routine cleaning and maintenance	No corrosion detected during inspections	Routine inspections	Cleaning and disinfection Coating	Inspection Records Cleaning and disinfection records
DISTRIBUTION	Cross connection between potable water and non-potable water	C Unlikely	3 Major	Cross connection control programme (identification of cross connection, installation of the proper backflow prevention assemblies)	No defections on the backflow prevention devices	Routine inspection and annual testing of backflow prevention assemblies	Repair or replace backflow prevention assemblies	Inspection and testing records

Definition of control measures

Suitable control measures must be identified to ensure the prevention of potable water contamination incidents. All control measures for significant hazards or hazardous event must be assessed and recorded. The measures should be indicated on the flow diagram/table corresponding to the possible hazardous events.

Control measures include water treatment procedures, routine monitoring and inspections, maintenance, repair or replacement of equipment, cross connection control, labelling of pipes and hoses and training of the crew, temperature controls and flushing of infrequently used equipment.

Water production and private water supplies

Potable water produced at sea using low pressure evaporator or reverse osmosis plants are considered to be private water sources and should be controlled as such with appropriate monitoring and risk assessment.

Operational monitoring

Control measures must be monitored in order to spot any deviations from the operational limits. Operational monitoring should include measurement of selected water parameters, and the equipment and construction inspection procedures. Operational monitoring must provide early warning of failure of halogenation or any other operational limit violations to enable effective water system management. In most cases, operational monitoring involves basic water quality tests (pH, halogen residuals) and routine hygienic inspections.

An operational monitoring plan should be put in place and include the following basic elements:

- Define the sampling points and frequency of sampling.
- List the equipment required for monitoring water systems.
- Establish the monitoring equipment standards (calibration, certification).
- Ensure compliance with standard methods of water examination.
- Define the locations to be inspected and frequency of inspections.
- Define the required qualifications of crew carrying out the monitoring.

Operational limits

Auditing the performance of control measures requires setting of operational limits for each one. An operational limit is a criterion which indicates whether the control measure is functioning as designed. Operational limits might be either the upper limits or lower limits of the parameter values (such as pH, halogen residual, temperature) or observable factors.

Management Plan

Corrective actions may include repair or replacement of equipment, superhalogenation/ shock dosing, flushing and dumping and then re-bunkering or reloading, etc.

Verification monitoring

In order to provide a final assurance that the water supply system is operating safely, verification monitoring should be established. This includes microbiological and chemical sampling and analysis (including the following – selection of measured parameters, frequency, sampling points and methods), quality assurance and quality control.

Annex 16: Suggested competences for the training of crew responsible for the WSP implementation

The persons responsible for conducting the risk assessment should have the knowledge:

- to understand the source of hazards (physical, microbiological, chemical) and the reason for their presence;
- to recognise hazardous events on ship water systems;
- to characterise risks;
- to decide about control measures and corrective actions;
- to collect all the information needed to conduct the risk assessment;
- to interpret information collected to conduct the risk assessment.

The team leader/manager responsible for the WSP should:

- be a senior officer working on the ship;
- have the knowledge to ensure that the WSP is implemented effectively;
- understand the hazards and hazardous events;
- have knowledge of the structure and policy of the company;
- recognise non-conformities of the operational limits as set out in the WSP;
- be able to supervise and make sure that control measures and corrective actions are correctly implemented;
- recognise when revisions of the WSP are needed;
- communicate effectively with all crew involved in the water system operation.

The persons responsible for the every day operation of the water systems should be able to:

- carry out the monitoring procedures, control measures and corrective actions;
- implement correctly the procedures described in the WSP;
- recognise non conformities and the need to report them;
- maintain the records and documents.

Annex 17: Parameters for water quality monitoring (Directive 98/83/EC)

Microbial parameters	
Parameter	**Parametric value**
Escherichia coli (*E. coli*)	0/100 mL
Enterococci	0/100 mL
The following applies to water offered for sale in bottles or containers	
Escherichia coli (*E. coli*)	0/250 mL
Enterococci	0/250 mL
Pseudomonas aeruginosa	0/250 mL
Colony count 22°C	100/mL
Colony count 37°C	20/mL

Water intended for human consumption shall be wholesome and clean if it meets the minimum requirements set out in the following table regarding chemical parameters.

Chemical parameters			
Parameter	**Parametric value**	**Unit**	**Notes**
Acrylamide	0.10	µg/L	Note 1
Antinomy	5.0	µg/L	--
Arsenic	10	µg/L	--
Benzene	1.0	µg/L	--
Benzo(a)pyrene	0.010	µg/L	--
Boron	1.0	mg/L	--
Bromate	10	µg/L	Note 2
Cadmium	5.0	µg/L	--
Chromium	50	µg/L	---
Copper	2.0	mg/L	Note 3
Cyanide	50	µg/L	--
1,2-dichloroethane	3.0	µg/L	--
Epichlorohydrin	0.10	µg/L	Note 1
Fluoride	1.5	mg/L	--
Lead	10	µg/L	Note 3 and 4
Mercury	1.0	µg/L	--
Nickel	20	µg/L	Note 3
Nitrate	50	mg/L	Note5
Nitrite	0.50	mg/L	Note 5
Pesticides	0.10	µg/L	Note 6 and 7
Pesticides - Total	0.50	µg/L	Note 6 and 8
Polycyclic aromatic hydrocarbons	0.10	µg/L	Sum of concentrations of specified compounds; Note 9
Selenium	10	µg/L	
Tetrachloroethene and trichloroethene	10	µg/L	Sum of concentration of specified parameters
Trihalomethanes - Total	100	µg/L	Sum of concentrations of specified compounds; Note 10
Vinyl chloride	0.50	µg/L	Note 1

Note 1: The parametric value refers to the residual monomer concentration in the water as calculated according to specifications of the maximum release from the corresponding polymer in contact with the water.
Note 2: Where possible, without compromising disinfection, MS should strive for a lower value. For water referred to in Article 6(1) (a), (b) and (d), the value must be met, at the latest, 10 calendar years after the entry into force of the Directive. The parametric value for bromate from five years after the entry into force of this Directive until 10 years after its entry into force is 25 µg/L.
Note 3: The value applies to a sample of water intended for human consumption obtained by an adequate sampling method at the tap and taken so as to be representative of a weekly average value ingested by consumers. Where appropriate the sampling and monitoring methods must be applied in a harmonised fashion to be drawn up in accordance with Article 7(4). MS must take account of the occurrence of peak levels that may cause adverse effects on human health.
Note 4: For water referred to in Article 6(1) (a), (b) and (d), the value must be met, at the latest, 15 calendar years after the entry into force of this Directive. The parametric value for lead from five years after the entry into force of this Directive until 15 years after its entry into force is 25 µg/L. MS must ensure that all appropriate measures are taken to reduce the concentration of lead in water intended for human consumption as much as possible during the period needed to achieve compliance with the parametric value. When implementing the measures to achieve compliance with that value MS must progressively give priority where lead concentrations in water intended for human consumption are highest.
Note 5: MS must ensure that the condition that [nitrate]/50 + [nitrite]/3 ≤ 1, the square brackets signifying the concentrations in mg/L for nitrate (NO_3) and nitrite (NO_2), is complied with and that the value of 0.10 mg/L for nitrites is complied with ex water treatment works.

Note 6: Pesticides means:

- organic insecticides,
- organic herbicides,
- organic fungicides,
- organic nematodicide,
- organic acaricides,
- organic algicides,
- organic rodenticides
- organic slimicides,
- related products (inter alia, growth regulators)

and their relevant metabolites, degradation and reaction products. Only those pesticides which are likely to be present in a given supply need be monitored.

Note 7: The parametric value applies to each individual pesticide. In the case of aldrin, dieldrin, heptachlor and heptachlor epoxide the parametric value is 0.030 µg/L.

Note 8: "Pesticides – Total" means the sum of all individual pesticides detected and quantified in the monitoring procedure.

Note 9: The specified compounds are:

- benzo(b)fluoranthene,
- benzo(k)fluoranthene,
- benzo(ghi)perylene,
- indeno(1,2,3-cd)pyrene.

Note 10: Where possible, without compromising disinfection, MS should strive for a lower value. The specified compounds are: chloroform, bromoform, dibromochloromethane, bromodichloromethane. For the water referred to in Article 6(1)(a), (b) and (d), the value must be met, at the latest, 10 calendar years after the entry into force of this Directive. The parametric value for total THMs from five years after the entry into force of this Directive until 10 years after its entry into force is 150 µg/L.

In the event of non-compliance with the parametric values or with the specifications set out in the following table, ships in collaboration with competent authorities should consider whether that non-compliance poses any risk to human health. They should take remedial action to restore the quality of the water where that is necessary to protect human health.

Indicator parameters			
Parameter	**Parametric value**	**Unit**	**Notes**
Aluminum	200	µg/L	--
Ammonium	0.50	mg/L	--
Chloride	250	mg/L	Note 1
Clostridium perfringens (including spores)	0	number/100 mL	Note 2
Colour	Acceptable to consumers and no abnormal change		--
Conductivity	2500	µS/cm at 20°C	Note 1
Hydrogen ion concentration	≥ 6.5 and ≤ 9.5	pH units	Note 1 and 3
Iron	200	µg/L	--
Manganese	50	µg/L	--
Odour	Acceptable to consumers and no abnormal change		--
Oxidisability	5.0	mg/L O_2	Note 4
Sulphate	250	mg/L	Note 1
Sodium	200	mg/L	--
Taste	Acceptable to consumers and no abnormal change		--
Colony count 22°C	No abnormal change		--
Coliform bacteria	0	number/100 mL	Note 5
Total organic carbon (TOC)	No abnormal change	µg/L	Note 6
Turbidity	Acceptable to consumers and no abnormal change		Note 7
Tritium	100	Bq/L	Notes 8 and 10
Total indicative dose	0.10	mSv/year	Notes 9 and 10

Note 1: The water should not be aggressive (causing metal work to corrode).

Note 2: This parameter need not be measured unless the water originates from or is influenced by surface water. In the event of non-compliance with this parametric value, the MS concerned must investigate the supply to ensure that there is no potential danger to human health arising from the presence of pathogenic microorganisms, e.g. cryptosporidium. MS must include the results of all such investigations in the reports they must submit under Article 13(2).

Note 3: For still water put into bottles or containers, the minimum value may be reduced to 4.5 pH units. For water put into bottles or containers which is naturally rich in or artificially enriched with carbon dioxide, the minimum value may be lower.

Note 4: This parameter need not be measured if the parameter TOC is analysed.

Note 5: For water put into bottles or containers the unit is number/250 mL.

Note 6: This parameter need not be measured for supplies of less than 10000 m^3 a day.

Note 7: In the case of surface water treatment, MS should strive for a parametric value not exceeding 1.0 NTU (nephelometric turbidity units) in the water ex treatment works.

Note 8: Monitoring frequencies to be set later in Annex II.

Note 9: Excluding tritium, potassium-40, radon and radon decay products; monitoring frequencies, monitoring methods and the most relevant locations for monitoring points to be set later in Annex II.
Note 10: 1. The proposals required by Note 8 on monitoring frequencies, (and Note 9 on monitoring frequencies, monitoring methods and the most relevant locations for monitoring points in Annex II) should be adopted in accordance with the procedure laid down in Article 12. When elaborating these proposals the Commission should take into account inter alia the relevant provisions under existing legislation or appropriate monitoring programmes including monitoring results as derived from them. The Commission should submit these proposals at the latest within 18 months following the date referred to in Article 18 of the Directive.
2. A MS is not required to monitor drinking water for tritium or radioactivity to establish total indicative dose where it is satisfied that, on the basis of other monitoring carried out, the levels of tritium of the calculated total indicative dose are well below the parametric value. In that case, it should communicate the grounds for its decision to the Commission, including the results of this other monitoring carried out.

Annex 18: Recommended Faecal and Vomit Accident Release Plan

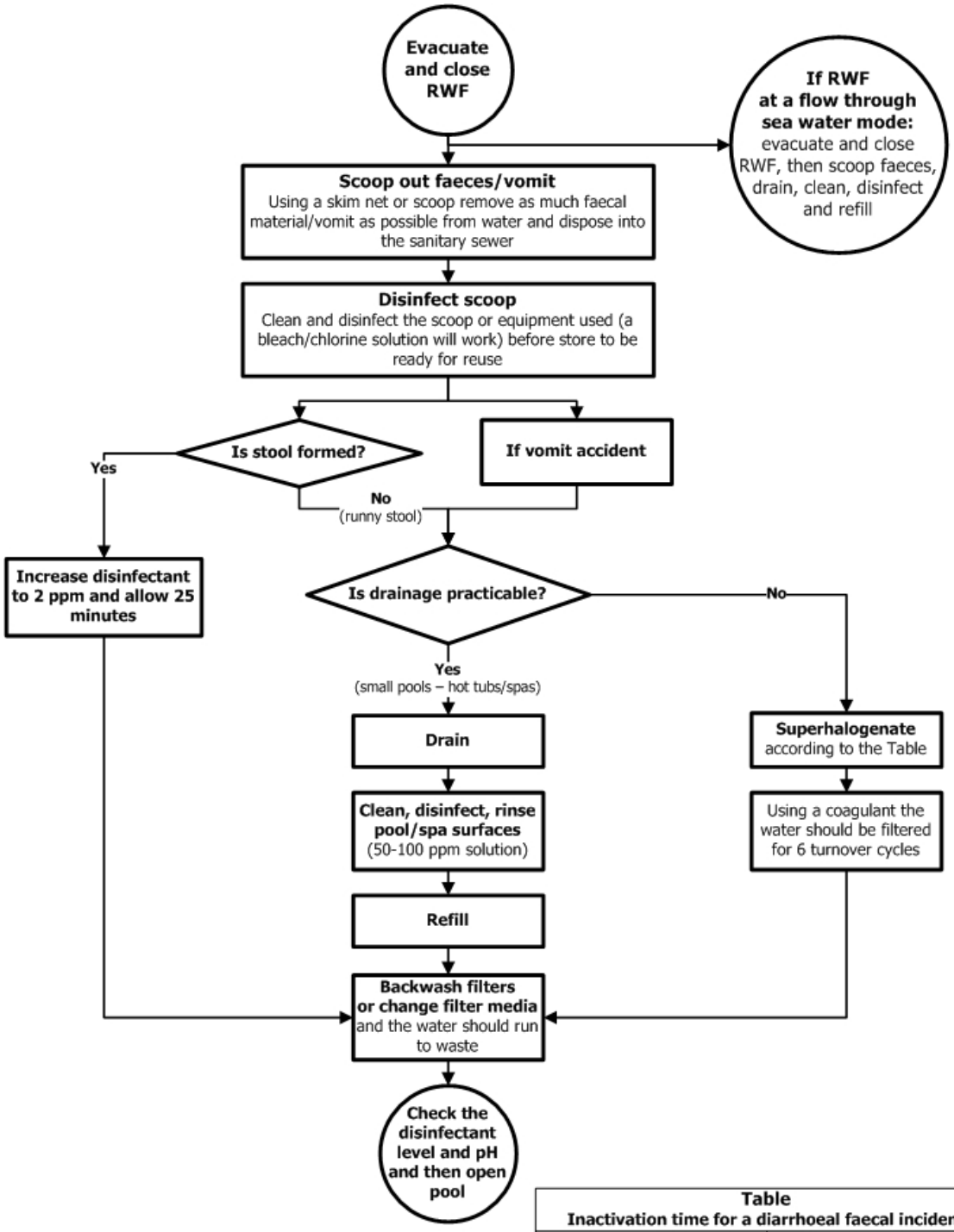


Table
Inactivation time for a diarrhoeal faecal incident

Free chlorine level (ppm)	**Disinfection time**
10	1530 minutes (25.5 hours)
20	765 minutes (12.75 hours)
40	383 minutes (6.5 hours)

Superhalogenation should be that the product between halogen residual and recirculation time is as follows:
_____ ppm x _____ minutes = 15300

Maintain pH of 7.2-7.5 during contact time

Annex 19: Rules for sampling and testing of water from recreational water facilities

General rules for chemical and microbiological testing	
1	Handle the testing equipment and reagents with clean hands. Rinse off any reagents that get on your skin.
2	Collect the sample from a location that contains well mixed pool water and "grab" a sample from a depth of **5-30 cm**.
3	Carry out the tests immediately after samples are taken.
4	Follow carefully instructions for test kits (time and temperature are important parameters of testing).
5	Store the equipment, properly boxed or cased, in a cool, clean, dry place. Do not interchange parts such as sample cells, caps or droppers.
Additional rules for microbiological testing	
1	Sampling bottles should be clean and sterilised.
2	For disinfected waters prior to sampling and sterilisation in the oven a dechlorinating agent (e.g. sodium thiosulphate: $Na_2S_2O_3\,5H_2O$) should be placed in the bottle: a quantity of 20-50 mg for a litre of water sample.
3	The sampling process should be according to the following: Remove the bottle cap with caution and place it in clean and sterile spot. Hold the bottle from the bottom and immerse it at a depth of 20 cm, move it horizontally to fill with water. A free space should be left on the top in order to allow space for an ease mixing. Cap the bottle and cover the cap with aluminum foil. Place it inside the heat insulating container and transfer it to the lab.
4	Testing should be done as soon as possible after sample collection. It should be done the same day. Heat insulating containers should be used for the transfer of samples to the lab in order to keep the temperature constant. If the time between sampling and testing exceeds 6 hours then the samples should be kept at a temperature of 5°C (41°F) utilising ice cubes.

Annex 20: Suggestions for corrective actions to be taken in case of water quality parameters out of limits in recreational water facilities

Corrective actions:

- Engineering parts of pools should be checked and tested for proper operation.
- Filter media should be checked.
- Chemical or microbiological tests should be repeated carefully.
- Apply filter backwashing.
- Change filters media if it is thought to be appropriate.
- Renew water if it is practicable.
- Adjust water chemistry by the addition of appropriate chemicals (in case of manual addition of chemicals, the pool should remain closed until dilution of chemicals is assured and water quality has returned to desired standards).
- Apply shock dosing in case of microbiological contamination. That means that disinfectant dosage is increased up to 20 or 50 mg/L for few hours while the pool is not in use by bathers.
- For accidental faecal release or vomit an emergency plan should be ready and should meet or exceed the sample in Annex 18.
- If remediation actions taken are not effective then an independent consultant may be requested to investigate the problem.

Annex 21: Examples of health advisory signs for recreational water facilities

SWIMMING POOL SIGN – suggestions for content

Annex 22: Guidelines for the determination and assessment of risk of hazardous chemical agents [Directive 98/24/EC]

The employer must determine whether any hazardous chemical agents are present at the workplace and assess any risk to the safety and health arising from their presence, taking into consideration:

- their hazardous properties;
- information on safety and health provided by the supplier;
- the level, type and duration of exposure;
- the circumstances of work involving such agents, including their concentration;
- any national occupational exposure or biological limit values;
- the effect of preventive measures taken or to be taken;
- the conclusions to be drawn from any health surveillance already undertaken.

Risks must be eliminated or reduced to a minimum by:

- the design and organisation of work systems;
- the provision of suitable equipment for any work with chemical agents;
- reducing to a minimum the number of workers exposed or likely to be exposed;
- reducing to a minimum the duration and intensity of exposure;
- appropriate hygiene measures;
- reducing the quantity of chemical agents present at the workplace to the minimum required for the type of work concerned;
- suitable working procedures.

Where the nature of the activity does not permit risk to be eliminated by substitution, the following protection and prevention measures must be taken, listed in order of priority:

- design of appropriate work processes and engineering controls and use of adequate equipment and materials so as to avoid or minimise the release of hazardous chemical agents;
- application of collective protection measures at the source of the risk;
- application of personal protection measures.

The employer must ensure that workers and/or their representatives are provided with:

- the results of the risk assessment;
- full information on the hazardous chemical agents present at the workplace;
- training and information on the appropriate precautions and on the personal and collective protection measures that are to be taken;
- access to any safety data sheet provided by the supplier.

The information must be properly provided and updated to take into account any occurring changes in the meantime.

Annex 23: Background information for influenza

The influenza virus can be spread from person to person, or via indirect transmission from the environment to an individual. When an infected person coughs or sneezes they release droplets containing virus particles. Transmission to a susceptible host may occur when a droplet makes contact with conjunctiva or mucous membranes through a direct cough or sneeze, through inhaling air containing droplet nuclei or from physical touch with an infected individual. The virus can be also transferred from surfaces contaminated by droplets to mucous membranes of the eyes, nose and mouth (Weber and Stilianakis, 2008). Recent publications highlighted the importance of airborne transmission in indoor environments (Chen et al., 2009; Chen and Liao, 2010; Chen and Liao, 2008; Shaman and Kohn, 2009; Weber and Stilianakis, 2008).

In the event of ILI on board a passenger ship, the main threat is related to those passengers and crew who are at higher risk of developing complications from influenza and in whom the disease might be life threatening. Elderly people are at risk for developing complications when infected by seasonal flu and therefore, prompt diagnosis is important among elderly passengers (World Health Organization, 2009). On one cruise ship that was the site of an outbreak of influenza, an investigation revealed that 77.4% of the 1448 passengers were 65 years of age or older and 26.2% had chronic medical problems (1997).

Outbreaks of seasonal influenza have occurred on board passenger ships in recent years, as well as cases of the pandemic (H1N1) 2009 influenza (Russell, 2009). From 1997 to 2005, 9 confirmed outbreaks of influenza linked to ships have been published in the scientific literature. The infectious agent in 7 out of the 9 was Influenza A virus and in one Influenza B. A total of 898 cases have been reported including passengers and crew, and two of them were fatal. The attack rate ranged between 0.5 to 37% (1999a; 1999b; 1987; 1998; Brotherton et al., 2003; Christenson et al., 1987; Ferson et al., 2000; Ferson and Ressler, 2005; Miller et al., 1998; Miller et al., 2000; MMWR, 2001). Because on passenger ships a large number of people gather together, they can provide an important environment for the spread of influenza from person to person or indirect transmission (e.g. contaminated surfaces) (Kak, 2007; Wilson, 2003). During a cruise or ferry voyage, passengers and crew may be from many nations, spend much of their time indoors and can intermingle. Shipboard activities and events such as dining, games, and movies increase the chance of flu transmission between passengers and also among the crew (Miller et al., 2000). If a large number of crew members fall ill and are unable to perform their duties, the safety of sailing might be affected. Ill passengers will have their holidays spoilt.

Epidemics of influenza affect Europe and the rest of the northern hemisphere during the winter season. The southern hemisphere has a similar epidemic period in its winter months (June to October). In the tropics influenza transmission may be all year round, with no seasonal pattern. As there is usually only a small variation between one year's epidemic strain and that of the following year, it is possible to produce a vaccine for the coming influenza season with a good chance that it will be protective for seasonal influenza caused by influenza A or B strains which are the same as previous years or have minor variation only. Many people may have some immune protection from exposure in previous years. Pandemics occur when a strain of influenza appears which is very different to proceeding years and for which most of the population have little or no immunity to.

This allows the virus to spread around the world. At the beginning of a pandemic, the severity of symptoms and at-risk groups will be unknown, and there will be no available vaccine.

Influenza virus characteristics – Environmental persistence

- RNA virus, family Orthomyxoviridae
- Enveloped virus
- Droplet particles (10 µm) settling from a height of 1.5 m in about 8 minutes (Weber and Stilianakis, 2008)
- Influenza A virus can survive:
  - on hard, nonporous surfaces (e.g. stainless steel, hard plastic) for 24-48 hours (Bean et al., 1982)
  - on porous materials (e.g. cloth, paper) for <8–12 hours in ambient temperatures (Bean et al., 1982).
- Virus persistence on surfaces increases up to 72 hours when those surfaces are moist or wet (Barker et al., 2001).
- Dried influenza virus can remain stable on the hands for <5 minutes (Bean et al., 1982).
- Infectious virus can be transferred to hands from nonporous surfaces for at least 2-8 hours during periods of heavy viral shedding in respiratory secretions (Bean et al., 1982).
- Transfer of viable influenza A virus from paper tissue to hands was only possible for 15 minutes, but transfer from stainless steel to hands for 24 hours (Bean et al., 1982).
- It is probably inactivated in water with free residual chlorine (0.52–1.08 mg/L) (experiments performed used avian influenza virus) (Rice et al., 2007).

Annex 24: Model health questionnaires for screening persons before embarkation

CRUISE LINES INTERNATIONAL ASSOCIATION, INC.

Public Health Questionnaire

Must be completed by ALL persons age 18 and above boarding the vessel - one form per adult

Date: _____

Ship: _____

Cabin No: _____

Name: _____

Names of all children under the age of 18 travelling with you.

1. _____ 3. _____

2. _____ 4. _____

To assist us in preventing the spread of ***Communicable Diseases*** *during your cruise, we require you to answer the following questions:*

1. Do you, or any person listed above, have any **ONE** of the following symptoms: **Fever or Feverishness, Cough, Runny Nose or Sore Throat OR** has anyone been **in contact with a confirmed InfluenzaA(H1N1) case?**

☐ **Yes** ☐ **No**

2. Within the **last 2 days**, have you or any person listed above developed any symptoms of **Diarrhea or Vomiting?**

☐ **Yes** ☐ **No**

If you answer "Yes", you will be assessed free of charge by a member of our shipboard medical staff. You will be allowed to travel, unless you are suspected to have an illness of international public health concern.

I certify that the above declaration is true and correct and that any dishonest answers may have serious public health implications.

Signature: _____

Thank you CLIA Rev7

Public Health Questionnaire

Must be completed by ALL persons age 18 and above boarding the vessel - one form per adult

Date: _____

Ship: _____

Cabin No: _____

Name: _____

Names of all children under the age of 18 travelling with you.

1. _____ **3.** _____

2. _____ **4.** _____

To assist us in preventing the spread of *Communicable Diseases during your cruise, we require you to answer the following questions:*

1. Do you, or any person listed above, have a Fever or Feverishness PLUS any ONE of the following additional symptoms: Cough, Runny Nose or Sore Throat?

☐ Yes ☐ No

2. Within the last 2 days, have you or any person listed above developed any symptoms of Diarrhoea or Vomiting?

☐ Yes ☐ No

If you answer "Yes", you will be assessed free of charge by a member of the shipboard medical staff. You will be allowed to travel, unless you are suspected to have an illness of international public health concern.

I certify that the above declaration is true and correct and that any dishonest answers may have serious public health implications.

Signature: _____

Thank you

Annex 25: Examples of informative leaflet for the pandemic A(H1N1) 2009 influenza virus

What is Influenza A(H1N1)?

The present influenza A(H1N1)v virus is a new virus subtype of influenza affecting humans, which contains segments of genes from pig, bird and human influenza viruses in a combination that has never been observed before anywhere in the world. New viruses are often the result of a re-assortment of genes from two other viruses (swap of genes). This A(H1N1)v virus is the result of a combination of two swine influenza viruses that contained genes of avian and human origin.

How does it spread?

By inhalation of the air that contains droplets from infected people who cough or sneeze,

OR

By transferring the virus directly by hand or from surfaces contaminated by droplets to mucous membranes of the eyes, nose and mouth

What can I do to help prevent disease spreading?

- **Avoid close contact with sick people!**
- **Wash or clean your hands frequently!**

Washing or disinfecting your hands thoroughly will help protect you from viruses.

- Wash your hands thoroughly with soap and water, especially after you cough or sneeze.
- You should wash your hands for at least 20 seconds each time.

Liquids or gels are more effective than alcohol-soaked tissues.

- **Avoid touching your eyes, nose or mouth!**

Viruses are often spread when a person touches something that has been contaminated and subsequently touches their eyes, nose or mouth.
(source: European Center for Disease Prevention and Control, ECDC)

How will I know if I have it?

Symptoms of influenza A(H1N1) in humans are usually similar to regular human seasonal influenza symptoms:

- Fever
- Respiratory symptoms such as cough or runny nose
- Sore throat
- Possibly other symptoms such as

– Body aches (particularly muscle pain)
– Headache
– Chills
– Fatigue
– Vomiting or diarrhoea (not typical for influenza but reported by some of the recent cases of the new influenza)

In some cases, severe complications could occur even in normally healthy persons who become infected with the virus.

What should I do if I have it?

- **Report immediately**
- **Stay at your cabin**
- **Seek Medical advice at your cabin**
- **Immediately dispose of your used tissue in a waste bin**

Higher Risk Groups

Some people are at higher risk of complications from flu. They may require additional treatment or monitoring. This group includes children under 3, pregnant women and people with heart failure, chronic lung disease, diabetes and kidney disease or people receiving cancer treatment.

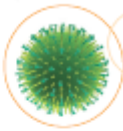
What should I do after I return?

In case you develop fever (38°C, 100°F or more) and influenza-like symptoms (such as a runny nose, sore throat, cough, fatigue, general body pains) within seven days of your return from travel, you should rapidly seek medical attention by telephone, informing the persons you consult about your recent travel, in accordance to your national health authorities' recommendations.

ecdc

What you need to know about Influenza

Prototype Product
Produced for demonstration purpose only. Messages and design may need to be adapted for different national contexts.



What is Influenza?

Seasonal influenza – or 'flu' – is caused by a virus which infects the respiratory system (nose, throat, bronchi and sometimes lungs). It is a communicable infection spread from person to person via large droplets from the coughs and sneezes of an infected person (direct) or by indirect contact.

How do you catch influenza?

Influenza (the flu) spreads from person to person in the following ways: in droplets from an infected person coughing and sneezing and indirect contact when droplets or secretions from the nose and throat settle on objects (including hands) which then are touched by other people who touch their own mouth or nose. Occasionally influenza is spread through finer droplets called aerosols, though this is uncommon.

How do you know you have influenza?

Individuals are most infectious soon after they develop symptoms and, although they can continue to excrete viruses for up to five days after the onset of symptoms (7 days in children), the amount of virus and hence the infection risk drops steadily. The disease can be anything from mild to very severe: someone suffering from the flu can experience anything from only few symptoms to becoming seriously ill.

Symptoms

Common symptoms include:

runny or stuffy nose	headache	tiredness
fever	cough	diarrhoea *
body aches	sore throat	vomiting *

* more common among children than adults

It is most important to stay home and away from others when you begin to develop symptoms.

To avoid getting influenza:

- Wash your hands regularly [and especially before eating]
- Cover your mouth and nose with a tissue when you sneeze
- Dispose of tissues properly
- If you do not have a tissue available, cover your mouth and nose
- Stay at home when you are ill

What is an influenza epidemic?

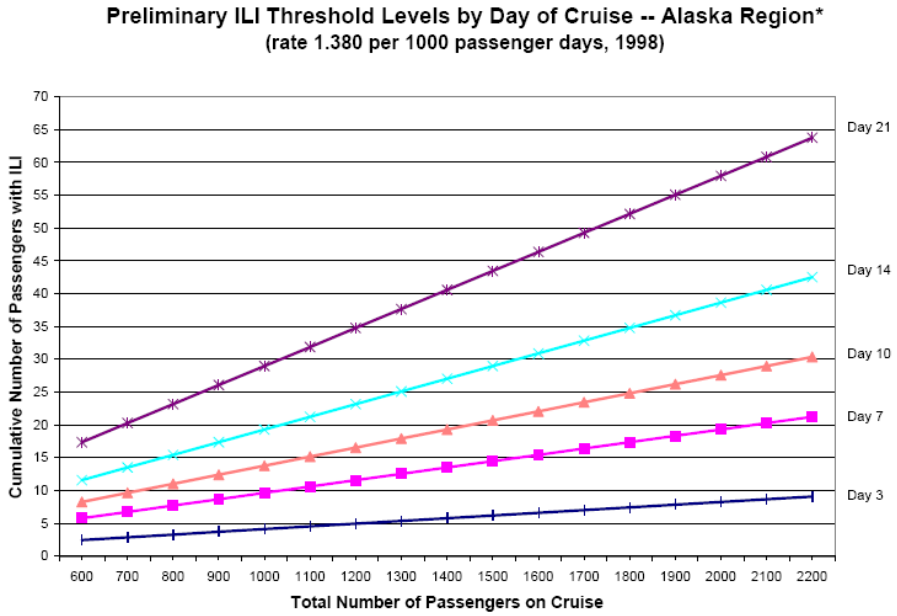
Influenza rapidly spreads around the world in seasonal epidemics. Due to its high contagiousness, it is commonly thought that seasonal influenza affects 5-15% of the global population every year. Influenza imposes a considerable burden in the form of health-care costs and lost productivity.

Who deals with influenza in Europe?

In addition to national authorities, the European Union has a specialised agency dealing with the prevention of communicable diseases such as influenza, the European Centre for Disease Prevention and Control (ECDC). ECDC's mission is to identify, assess and communicate current and emerging threats to human health posed by infectious diseases.

Annex 26: Example of calculating the ILI threshold levels of an outbreak

The following diagram presents an example of calculating the ILI threshold levels of an outbreak. Data from an outbreak occurred in a cruise in the Alaska region were used (Centres for Diseases Control and Prevention, 1999).



* Includes regional waters of Alaska, British Columbia, and Washington State

ILI threshold levels by day of cruise (Centres for Diseases Control and Prevention, 1999):

1. Determine the total number of passengers on the cruise (horizontal axis).
2. Determine the day of the cruise (right side of graph).
3. On the graph, plot the point of intersection of the total number of passengers on the cruise and the line indicating the cumulative number of passengers with ILI by day of cruise, for the cruise day of interest.
4. Read the number of passengers with ILI on the left vertical axis: This is the level at or above which an influenza outbreak is likely occurring.

Annex 27: Examples of preventive measures for gastroenteritis infections including norovirus

Ship companies	Issue pre-embarkation health questionnaire or health advice. Isolate ill passengers in their cabins. Isolate ill crew, if necessary by separation as a group from those who are well (cohorting). Close off potentially contaminated areas until cleaned and disinfected Educate passengers concerning transmission. Restrict activities of exposed food handlers who have had contact with cases. Restrict health care personnel in contact with infected persons. Provide PPE (aprons, gloves) for health care personnel caring for and others in contact with affected persons. Protect self-service areas (and all open food) and self-service utensils. Use dissolvable laundry bags and designated machines for laundry from affected people. Provide sanitary diaper/nappy changing in child care areas. Ensure safety of potable water sources and production/distribution. Ensure safe sewage disposal and deal quickly with any blockages or backflow issues. Close recreational water areas during outbreaks.
Passengers	Wash hands after using the toilet. Wash hands before eating or entering a food service area. Shower before using recreational water facility. Postpone travelling if ill.
Crew	Cabin crew to report body fluid spillages. Cleaning teams trained and supervised. Wear PPE such as gloves and gowns when cleaning. Clean and disinfect all surfaces in repeated contact with human hands on a routine basis. Clean and disinfect all surfaces and objects soiled by vomit or faeces immediately. Exclude ill crew (with relevant symptoms) from working. Exclude exposed food handlers from contact with food. Minimise or eliminate bare hand contact with food. Cook all foods, especially shellfish, to the recommended core temperatures and times. Thoroughly wash all vegetables and fruit before preparation. Decontaminate and wash leafy vegetables and berries.

Annex 28: Example of hazard analysis in prevention of gastroenteritis transmission on board ship

HACCP

A systematic analysis of the chain of infection should identify the key elements which permit transmission and what measures can be put in place. These key links in the chain that must be broken are called "critical control points". The HACCP process is a familiar one in food hygiene and is equally appropriate here. Those links in the chain that are not deemed critical are still important, and interventions should be made to the extent possible, but the focus on the critical control points must not be lost.

- Presence of an infected person
- Poor personal hygiene
- Environmental surfaces and objects contaminated by faeces or vomit
- Aerosolised norovirus from vomit
- Food handler who is ill, or excreting microorganisms asymptomatically, handling food with bare hands
- Contaminated raw foods, e.g. shellfish, salads, berries
- Contaminated drinking water
- Contaminated recreational water, e.g. pools and spa
- Contaminated ice
- Cross contamination of foods by infected consumer
- Inadequate cooking of shellfish or meat or fish
- Waste
- Disease going unnoticed
- Shore excursions

For a fuller account of GI prevention, see Guideline II of the manual.

Annex 29: Disinfectants

Disinfectants used routinely and in outbreaks need to be effective against a range of bacteria and viruses. At present, disinfectants cannot be tested against norovirus directly as it cannot be grown in tissue culture. Therefore, feline *Calicivirus* sp. (FCV) has often been used as a surrogate for norovirus in laboratory studies.

Quaternary ammonium compounds (QUAT) are often used in disinfectant products and are effective against many bacteria but they do not have significant activity against some viruses, including norovirus. However, a QUAT based disinfectant which has been proven to be effective against FCV is Formulation R-82™ produced by Lonza and incorporated in a number of products in the United States. This product has received a US Environmental Protection Agency approved claim against FCV. A similar disinfectant, Formulation DR-25a™ has been developed by Lonza for the European market.

Alcohol based disinfectants may be used to control bacteria but are generally not very effective against viruses such as norovirus/FCV. As such, their use as a surface disinfectant is not recommended. However, alcohol-based hand disinfectants are frequently used as an adjunct to hand washing and are recommended for health care personnel, especially after caring for infected persons. Claims are made by the manufacturers of some hand-gels for effectiveness against norovirus; if in doubt, check with a reliable independent website of accredited products, such as the US Environmental Protection Agency (see EPA, page 17).

High concentrations of sodium hypochlorite (1000 mg/L) are effective against a wide range of bacteria and viruses and have been shown to be effective against FCV. However, pre-reconstituted hypochlorite was found to be less effective than the freshly reconstituted granular form. The pre-reconstituted form required a concentration of 5000 mg/L to completely inactivate the virus. Hypochlorite solutions lose effectiveness on standing therefore freshly reconstituted solutions are essential in outbreak settings.

Other virucidal disinfectants

The per-oxygen compound Virkon-S® has a US Environmental Protection Agency approved claim against FCV. It contains potassium peroxymonosulphate and other active ingredients which work synergistically to attack the key structures within the virus. It has been demonstrated to not be inactivated by organic challenge.

Accelerated hydrogen peroxide™ has been reported as being an effective disinfectant against FCV.

Iodine-based disinfectant has been shown to be very effective at inactivating FCV, but it has the disadvantage of discolouring treated surfaces.

Glutaraldehyde based disinfectants have been reported to inactivate FCV. Phenol-based disinfectants have also been shown to be effective against FCV in the laboratory. Both phenol and glutaraldehyde based disinfectants have potential toxicity and are of limited practical use.

Chlorine dioxide has been shown to be effective disinfectant against FCV with a contact time of 10 minutes; however, chlorine dioxide is quite unstable. Cryocide 20™, a product containing stabilised

chlorine dioxide and a twin chained QUAT, has been shown to have effective virucidal activity against FCV after a contact time of 30 minutes.

Examples of producers' claims can be found in the Health Protection Agency Norovirus guidelines (section 8).

A list of products approved for use against norovirus can be found in the website of the US Environmental Protection Agency, List G: EPA's Registered Antimicrobial Products Effective Against Norovirus (Norwalk-like virus), January 9, 2009

WWW.EPA.GOV/OPPAD001/LIST_G_NOROVIRUS.PDF.

Annex 30: Cleaning and disinfection procedures for dealing with potentially contaminated surfaces

Training and supervision of cleaning staff

Isolation of contaminated areas. On passenger ships, any public area in which a body fluid spillage has occurred which has caused contamination by vomit or faeces, should be closed or cordoned off immediately and access prevented until it has been cleaned and decontaminated with an appropriate virucidal disinfectant (Annex 29). The residuals should be covered as quickly as possible after the incident. Once cleaned and disinfected, the area should be ventilated and, where possible, not opened for public access for at least 1-2 hours after cleaning.

Gloving. Proper usage of gloves is needed when cleaning up vomit or faeces. Care should be taken when removing them, with thorough hand washing carried out afterwards, preferably followed by using alcohol-based hand gel. If gloves are contaminated and used for multiple tasks, contamination will spread easily. Gloving by food service workers helps to prevent any faecal transmission to ready to eat foods, but is not a substitute for good hand hygiene.

Removing norovirus. The most effective way of removing norovirus from surfaces is to wash with detergent before applying disinfectant. Washing alone cannot sufficiently reduce the number of viral particles to a safe level. The surface should then be disinfected with a product effective against viruses.

Types of disinfectants. When it comes to disinfecting surfaces, (0.1%) sodium hypochlorite with a contact time of one minute remains the 'gold standard' for hard surfaces. A list of disinfectants said to kill norovirus is shown in Annex 29.

Water quality. On board ships, the water used for chemical dilution and cleaning must be the same quality as the drinking water. Problems arise with quaternary ammonia compounds used in water with calcium or magnesium hardness above 500 mg/L. Poor quality water with contaminates such as iron, hydrogen sulfides and dissolved solids limit the action of disinfectants and cleaners. It is critical that the water be as free of organic solids as possible.

Clothes and wastewater. The area should be cleaned and disinfected using separate clothes and buckets for cleaning and disinfection. Clothes that have been used for cleaning or disinfection of contaminated areas must be destroyed or incinerated as they cannot be assured to be free from contamination. Wastewater from cleaning must be disposed of as sewage.

Toilets. Fixtures and fittings in toilet areas should be cleaned and disinfected with 0.1% sodium hypochlorite solution, or a suitable equivalent virucidal disinfectant. Floors and other hard horizontal surfaces should be cleaned and disinfected within an 8-metre radius of contamination. Mop heads, if reused, should be laundered in hot water above 60°C (140°F) and heat-dried on the hottest setting, or discarded.

Frequency of cleaning. During an outbreak public toilets should be cleaned at least once an hour when in use.

Steam cleaning. Steam cleaning is claimed to be an effective method of cleaning soft surfaces such as carpets and curtains during outbreaks. However, steam cleaning is questionable as a disinfection method alone as it is difficult to reach high enough temperatures within soft furnishings. It may be that it has a role combined with other measures. If detergents are used, application must be done with a clean disposable cloth.

Soft furnishings. Chairs and sofas as well as wall coverings and window treatments should be thoroughly disinfected with suitable virucidal disinfectant after all visible contaminants have been removed. Allowing them to air dry in the sun is beneficial, if possible. Soiled mattresses should be steam cleaned or discarded. Contaminated carpets should be steam cleaned and treated with a suitable virucidal disinfectant. Furnishings and other soft surfaces within an 8-metre radius of known points of contamination should be cleaned and disinfected as above.

Laundry. The laundry coming from known cases, or any soiled laundry during an outbreak, should be considered to be infectious. Laundry workers must use universal precautions when handling laundry during an outbreak. Laundry should be transported to the laundry area in separate trolleys/carts in sealed bags designated as bio-waste. Ideally, dissolvable alginate laundry bags should be used for all items from the cabins of affected people as they can be placed in washing machines without opening. Once in the laundry they must be laundered and handled separately from other items. The hottest water should be used and the highest machine dryer setting should be used. Soiled laundry suspected of being contaminated must not be sorted or come in contact with any surfaces in the laundry. Any (non-alginate) bags labelled as bio-waste, should be emptied directly into the washers. A suitable detergent should be used in the washing machine, e.g. accelerated potassium peroxymonosulfate.

Food service. Using the above principles, carefully remove all vomit and clean the area. Disinfect the food preparation area with 0.1% sodium hypochlorite solution or alternative designated virucidal disinfectant. Destroy all exposed foods and any foods prepared by the infected worker.

Leisure facilities. Facilities such as deckchairs should not be overlooked.

Recreational water facilities. If contaminated, these should be drained, cleaned with detergent, then disinfected with a suitable virucidal disinfectant before refilling.

Annex 31: Suggested content of an Outbreak Management Plan (OMP)

1. Basic epidemiological information
2. Purpose and scope of the OMP
3. Establishment of on board incident team

3.1. Compositions

3.2. Duties and responsibilities

4. Outbreak management procedures

4.1. Response phases

4.1.1. Definitions of response phases (e.g. green, amber red, etc.)

4.1.2. Criteria for defining an outbreak

4.1.3. Criteria for defining a case

4.1.3.1. Clinical support for diagnosis

4.1.4. Criteria for defining an outbreak is over

4.2. Monitoring

4.3. Communication and education of crew and passengers

4.3.1. Non outbreak situation

4.3.2. Outbreak situation

4.4. Hygiene procedures (cleaning, disinfection, response to accidental faecal, vomit or blood releases, use of PPE, etc.)

4.5. Notification procedures within the company and with competent authorities

4.6. Documentation and record keeping

4.6.1. GI log

4.6.1.1. GI questionnaire

4.6.2. Recording forms

4.6.3. MDH

4.7. Instructions on OMP per crew member post: Instruction per crew member position for both non-outbreak situation and during an outbreak situation.

Example of a list of instruction to be included in the OMP for each crew member post:

Tasks / Crew Position	Education	Documentation	Communication	Monitoring	Reporting	Embarkation	Dissembarkation	Isolation	Medical Facility
Master	x		x						
Group Coordinator/ Event Coordinator	x	x							
F&B Director	x	x			x				
Chief Engineer	x	x		x					
HR Manager	x								
Hotel Manager	x	x	x		x				
Doctor	x		x	x	x			x	x
Staff Captain	x	x	x	x					

5. Update and modification of OMP

Annex 32: Epidemiology of gastrointestinal illness on board passenger ships

A study of gastrointestinal disease surveillance data collected by the US VSP reported that from 2001 to 2004, the background (non-outbreak) incidence of reported acute gastroenteritis on cruise ships was 3.25 passengers per cruise (48,206/14,842). The outbreak associated case incidence was 85 passengers per cruise (6,747 outbreak cases per 79 outbreak associated cruises). The combined outbreak and non-outbreak incidence rates of gastroenteritis per 100,000 passenger days among 14,842 cruises were higher on cruises more than 7 days long than on cruises of 3 to 7 days. Among 71 outbreak-associated cruises, the overall incidence rate was 4.8 outbreaks per 1,000 cruises and 3.8 outbreaks per 10,000,000 passenger days (Cramer et al., 2006).

A review of infirmary data from 4 cruise ships has shown that gastrointestinal illnesses account for less than 10% of all visits by passengers to ships' infirmaries (Peake et al., 1999).

The likelihood of contracting gastroenteritis on an average 7-day cruise at sea is less than 1% (Cramer et al., 2006).

The majority of the reported outbreaks to the VSP were attributed to norovirus infection, according to the website database (http://www.cdc.gov/nceh/vsp/surv/GIlist.htm#2001); however, foodborne disease outbreaks also occur. In a review of outbreaks of foodborne diseases associate with passenger ships from 1975 to 2003, 41 out of a total of 50 outbreaks, (82%) were due to bacterial pathogens (Rooney et al., 2004b). The principle pathogen was *Salmonella*, which caused more than one-quarter of the outbreaks. Other agents were enterotoxigenic *E. coli*, *Shigella*, *Vibrio cholera*, *Staphylococcus aureus*, *Clostridium perfringens*, *Trichinella*, and *Cyclospora*. Factors associated with the outbreaks included inadequate temperature control, infected food handlers, contaminated raw ingredients, cross contamination, inadequate heat treatment and onshore excursions. Seafood was the most common food vehicle implicated in outbreaks (Rooney et al., 2004b).

Waterborne outbreaks also occur on passengers ships. A review reported that from 1970 to 2003 there were 21 reported outbreaks of gastroenteritis associated with ships of all types whose probable or possible cause was waterborne. Of these, 12 were positively identified as having water or ice as a source. The majority of outbreaks were associated with passenger ships (18/21, 86%) (Rooney et al., 2004a). Enterotoxigenic *E. coli* was the principal pathogen and was involved in one-third of the outbreaks. Other pathogenic agents were *Salmonella, Shigella*, *Cryptosporidium* and *Giardia lamblia* (Rooney et al., 2004a).

Annex 33: Background information on Legionnaires' disease and *Legionella* spp.

How water systems on ships can be colonised by *Legionella* spp.

Legionella species can be found as free living organisms associated with biofilms or they can live and multiply inside protozoa such as amoebae. Aquatic environments such as ponds, ground waters, wells, rivers and wet soil are natural sources of legionellae and they are also found in artificial environments such as hot and cold domestic water systems. Water containing legionellae may be loaded from ports to the ship. Legionellae can colonise internal surfaces of water system and at appropriate warm temperatures (20-45°C, 68-113°F) they can proliferate, creating colonies with high numbers of bacteria. A biofilm is the accumulation of microorganisms, covered by a protective layer and attached to the water system surface. The presence of a biofilm within the internal surfaces of a water system provides nutrients and shelter to the *Legionella* bacteria, encouraging growth and colonisation. Parts of the biofilm may be released, contaminating the water and creating additional colonies in other parts of the system.

Outbreaks on passenger ships

Recognised risk factors for Legionnaires' disease include being of an older age group (>50 years) and many people on passenger ships belong to this age group (1997a; Peake et al., 1999).

Between 1996 and 2006, more than 32 incidents of ship associated Legionnaires' disease have been reported worldwide, involving 72 cases and 8 fatalities. The majority of cases occurred on board ships sailing within European waters (Mouchtouri et al., 2007).

The number of outbreaks and cases reported in the literature is an underestimate of the true incidence of the disease. As with hotels, outbreaks and cases associated with ships, especially ferries, are difficult to detect because the incubation period of 2-10 days or more means that passengers may have dispersed widely, including to different countries, before developing symptoms.

To detect Legionnaires' disease outbreaks, surveillance on board the ship, as well as by an international surveillance scheme such as the European Legionnaires' Disease Surveillance Network (ELDSNet) are necessary.

Characteristics of the microorganism

Studies have shown that:

- Naturally occurring *L. pneumophila* survived and multiplied in water at temperatures between 25°C (77°F) and 45°C (113°F), with an optimal temperature range of 32–42°C (90-108°F) (Yee and Wadowsky, 1982).
- At temperatures above 70°C (158°F) *Legionella* are destroyed almost instantly (Dennis et al., 1984; Dennis and Lee, 1988)
- *Legionella* have been isolated from environmental sources ranging from a pH of 2.7 to 8.3 (Sheehan et al., 2005).
- 0.1 mg/L of free chlorine kills 99% of *L. pneumophila* within 40 minutes (at 21°C (70°F), pH 7.6).
- *Legionella* survived inside amoebal cysts treated with 50 mg/L free chlorine (Kilvington and Price, 1990).
- A specific clone of *Legionella pneumophila* sg1 was able to survive for 17 years in a hospital water distribution system, despite several hyperchlorination applications (Garcia et al., 2008).
- *Legionella* have been found in saline water and therefore there is a risk for contamination of water systems operating with sea water (Heller et al., 1998).

Annex 34: Chlorine disinfection procedures of water tanks and distribution system (EWGLI 2005)

Chlorine is used for the treatment of hot and cold water systems. As the bactericidal action of the chlorine is pH sensitive and decreases rapidly at values above 7, the pH of the water will have to be monitored and may need adjustment. In systems that are colonised the chlorine residual will be used up quickly; it is therefore essential that monitoring of distal points in all parts of the system be carried out to ensure there is an effective concentration of free chlorine available.

Shock hyperchlorination

This must be carried out in water at a temperature below 30°C (86°F), with a single addition of chlorine to the water to obtain concentrations of free residual chlorine of 20-50 mg/L throughout the installation, including distal points. After a contact period of at least two hours with 20 mg/L of chlorine or at least one hour with 50 mg/L of chlorine, the water is drained. Fresh water is then drawn into the installation until the level of chlorine returns to the concentration of 0.2 mg/L and not more than 5.0 mg/L.

Continuous chlorination

This is achieved by the continuous addition of chlorine, usually in the form of calcium hypochlorite or sodium hypochlorite. Residual levels of chlorine can vary depending on the quality of the water, the flow, and the amount of the biofilm in the system. However, the residual disinfectant must be between 1 and 2 mg/L. The chlorine may not inactivate legionellae in areas in the water distribution system where there are stagnation or circulation problems. Although continuous chlorination has been used as a means of control in hot water systems, it is difficult to maintain the required levels of chlorine as it volatilises off from hot water. In addition, chlorine is corrosive and this effect is increased with raised temperatures.

Annex 35: Thermal disinfection procedures of hot water tanks and distribution system (EWGLI 2005)

Thermal shock

Thermal shock treatment at 70-80°C (158-176°F) for relatively short periods has been used both for emergency disinfection, and as part of long-term control programmes. However, recolonisation can frequently occur rapidly, even within a couple of weeks. This method carries an increased risk of scalding and must be carefully managed to avoid the risk. It is no longer recommended as part of a long-term control programme.

Thermal disinfection is carried out by raising the temperature of the whole of the contents of the hot water storage heater to 70-80°C (158-176°F) then circulating this water throughout the system for up to three days. To be effective, the temperature at the hot water storage heater should be high enough to ensure that the temperatures at the taps and appliances do not fall below 65°C (149°F). Each tap and appliance should be run sequentially for at least five minutes at the full temperature, and this should be measured. For effective thermal disinfection the water system needs to be well insulated.

It is essential to check that during the procedure, the temperature of the water in distal points reaches or exceeds 65°C (149°F).

At the end of the procedure, samples of water and sediment should be collected at distal points of the installation and examined for *Legionella*. If the result is unsatisfactory, the procedure must be repeated until documented decontamination is achieved. Following decontamination, microbiological checks must be repeated periodically.

Thermal treatment has the advantages that no special equipment is required so that the procedure can be carried out immediately, provided there is sufficient heat capacity in the system. However, the procedure requires considerable energy and manpower and is not normally practical for large systems but may be suitable for small systems. It will not disinfect downstream of thermostatic mixer valves, unless the valves can be overridden, and so is of limited value where such valves are installed. There is a severe risk of scalding at these temperatures. Although the numbers of *Legionella* may be reduced, recolonisation of the water system can occur from as little as a few weeks after treatment, particularly if it has not been accompanied by other remedial measures (EWGLI 2005).

Constant maintenance of the temperature between 55-60°C (131-140°F)

At 60°C (140°F) it takes approximately two minutes to inactivate 90% of a population of *L. pneumophila.* The effectiveness of maintaining the circulating temperature at 60°C (140°F) has been demonstrated both in hospitals and in hotels. Hot water installations maintained at temperatures above 50°C (122°F) are less frequently colonised by *Legionella*.

Circulating water at 60°C (140°F), such that the temperature at each outlet reaches at least 50°C (122°F) and preferably 55°C (131°F) within one minute of opening the outlet, is the method most commonly used to control *Legionella* in hot water distribution systems.

Although raising the temperature to a constant 60°C (140°F) has consistently been shown to control outbreaks it does not necessarily eliminate *Legionella* from the system but controls them at a level that prevents further cases. Provided there is sufficient heating capacity, it is relatively easy to implement and is easy to monitor continuously. It has the possible disadvantage of increasing energy consumption and there is an increased risk of scalding. Where thermostatic mixer valves are installed to reduce scalding risk, they must be subjected to a programme of planned monitoring and maintenance.

Annex 36: Personal Protective Equipment

Persons exposed to water sampling, cleaning or other procedure should wear suitable respiratory protective equipment. This can be a powered filter and hood, European Class TH3 (assigned protection factor of 40) or a power assisted filter and close fitting full face mask, TM3 (assigned protection factor 40). It should be borne in mind that the filter on these systems is liable to get wet, and consequently resistance to air can increase with consequent discomfort to the operator (EWGLI 2005).

Alternatively, a hood or full-face mask fed with breathing quality compressed air may be used. The preferred equipment is a full-face close fitting airline mask with a positive pressure demand valve, under a hood or helmet protecting the rest of the head. The air supply should come from an oil free compressor drawing air through a filter from a location well upwind of any jetting operation, or through cylinder supplies of compressed air. Further information on respiratory protective equipment can be obtained from The Selection, Use and Maintenance of Respiratory Protective Equipment - a Practical Guide (EWGLI 2005).

Annex 37: Legionnaires' disease case investigation questionnaire

Name of person completing the form
Date reported
Ship name
Cabin number
Date on ship

Possible diagnosis:
Legionnaires' disease
Pontiac fever

Personal details
Sex Male ❒ Female ❒
Surname
Forename
Date of birth
Home address

Post code/zip code
Phone No.
Occupation
Nationality

Clinical history of case

Date of onset of symptoms:.....

(malaise, fever, respiratory symptoms, diarrhoea)

Did this patient have pneumonia? Yes ❒ No ❒ Unknown ❒

What were the other main clinical features?.....

.....

Has the patient had a recent organ transplant? Yes ❒ No ❒ Unknown ❒

Was the patient immunosuppressed for other reasons? Yes ❒ No ❒ Unknown ❒

If "yes", please give details:.....

Please give details of any other underlying condition: .....

Possible points of exposure to *Legionella* on the ship

In the 2 weeks before the onset of symptoms (please include dates where possible), did the patient:

Visit a whirlpool spa on board? Yes ❒ No ❒ Unknown ❒

If "yes", please give details (did you use the spa or spend time near it?) If there were multiple spas, which one was used? .....

.....

Use a whirlpool spa anywhere else? Yes ❒ No ❒ Unknown ❒

If "yes", please give details:.....

.....

Use a shower? Yes ❒ No ❒ Unknown ❒

If "yes", was it: at cabin? ❒ communal? ❒ elsewhere? ❒

Attend a dentist unit? Yes ❒ No ❒ Unknown ❒

If "yes", please give details:.....

.....

Use a nebuliser? Yes ❒ No ❒ Unknown ❒

If "yes", please give details:.....

.....

Spend any time near building works when ashore? Yes ❒ No ❒ Unknown ❒

If "yes", please give details:.....

.....

Spend any time near fountains on board the ship or when ashore? Yes ❒ No ❒ Unknown ❒

If "yes", please give details:.....

.....

Visit a public building when ashore? Yes ❒ No ❒ Unknown ❒

If "yes", please give details:.....

.....

Suspected travel associated infection other than the ship

If the patient has been away from home (other than on this ship) in the 2 weeks before the onset of symptoms of legionellosis, please give details:

Country	Town or resort	Other Ferries/ Cruise ships / hotels*	Date of state From	To

*including number of cabin/room

Company's details (including name of company/hotel/ship):.....

.....

Suspected Hospital acquired infection

Was the patient in hospital or did they visit someone in hospital for any time in the 2 weeks before the date of onset of symptoms?

Admitted to hospital ❒ Visited hospital ❒ Date of admission/visit ❒

Diagnosis on admission:.....

Type of ward or unit in which patient was resident/ a visitor (including number if known):
.....

If the patient was transferred from another hospital, please give details

Name of hospital before transfer:.....

Date of stay: From ..... to .....

Suspected employment associated infection

These questions apply to any work carried out in the 2 weeks before the onset of symptoms

Has the patient worked with water/water storage systems? Yes ❒ No ❒

If "yes", please give details:.....

.....

Has work involved/been located near cooling towers*? Yes ❒ No ❒ Unknown ❒

If "yes", please give details:.....

.....

(*cooling towers include commercial water cooling systems used in air conditioning plants)

Did the patient had the feel of exposure to a spray of water droplets on his/her face from fountains/cooling towers/water from water storage systems? Yes ❒ No ❒

If "yes", please give details:.....

.....

Legionella microbiology results

Did specimens collected from patient and tested for *Legionella*? Yes ❒ No ❒

If Yes, please specify method of examination and results: .....

Annex 38: Sampling guidelines (EWGLI 2005)

Safety measures

PPE should be provided as described in Annex 36.

Sampling the ship's water systems

Sample sites should be chosen to be representative of the whole water system. The water storage and piping plans should be consulted prior to selecting the sample points.

Distribution of sites to be sampled:

1. Systemic	Incoming cold water to the ship including any water tank
	Hot water leaving the water heater
	Circulating hot water returning to the heater
2. Basic	The outlet nearest to the entry of the hot water into the facility
	The most distal sites within the hot and cold distribution systems
	The cabin(s) where the infected guest(s) was/were accommodated
	The samples points in recreational water facilities
3. Complementary	Cabins on different decks to be representative of the different loops of the distribution systems
	Identification of the outlets from the coolest parts of the hot water system and the warmest parts of the cold water system should be made by temperature testing.

How to sample

Collect one litre samples in sterile containers containing sufficient sodium thiosulphate to neutralise any chlorine or other oxidising biocide. Measure the temperatures using a calibrated thermometer, placed in the middle of the water stream after the sample has been collected.

Systemic points

If possible, samples should be collected from the water softener if fitted, in the boiler room from the discharge valves of the hot water flowing from the heater to the other parts of the ship, return water and cold water feed to the heater. If hot water storage heaters/buffer vessels are installed, samples from the sludge drain valves should also be collected. If there are no suitably

representative sample points of the water in the heater, i.e. the water flowing from the heater and the flow returning to the heater, this fact should be recorded. If expansion vessels are incorporated these should be sampled if possible.

Basic and complementary points

Hot water

Collect the water discharging from the tap immediately after it is switched on. This "immediate" sample will be representative of the colonisation of the outlet and most representative of the risk to the user. Continue to run the tap until 60 seconds has passed and then measure the temperature.

If you wish to determine if the water feeding the outlet from the main cold water feed or circulating hot water system is colonised it is necessary to collect a sample from a tap after it has been flushed and disinfected. Run the tap for one minute, clean and disinfect the outside and inside of the tap spout with a 1% solution of sodium hypochlorite or 70% ethanol, leave it for at least one minute and then flush the outlet to remove residual disinfectant. Without adjusting the flow, collect the "post flush water sample" which represents the water feeding the outlet.

Swabs - sample the inner walls of showerheads and their handles with a sterile cotton swab using a rotating motion. Sample shower hoses at the point where it is attached to the fitting. Swabs should be transported in 0.5-1.0 mL of the same residual water, sterile water or sterile Pages Saline.

Sieves on mixer valves - remove the sieves and swab and culture any deposit within them.

Cold water

Collect an immediate sample as for the hot water, then leave the water running until it has flowed for two minutes in total and then measure the temperature of the flowing water. Finally, a post-flush sample may be collected if required in the manner described above. When the water temperature in the system is ≤20°C (68°F), the number of samples can be reduced.

Water closet cisterns

These should not be overlooked as potential sources of infection as they can become heavily colonised if the ambient temperature is high or the water closet is used infrequently e.g. disabled toilets often have restricted use. Collect water samples directly from the cistern using a clean sterile container. Swabs from the cistern at the waterline are also useful.

Spa pools

Collect water samples of one litre from the pool and, where fitted, the balance tank. In some investigations water from the pool has yielded few *Legionella* at the time of sampling although filter material and biofilm from inside the pipes contained large quantities of *Legionella*. This probably reflected the type and positioning of the biocide treatment and zones within the piping where the biocidal effect did not penetrate adequately. Therefore, it is also important to inspect the air and water circulation pipes and hoses for the presence of biofilm containing *Legionella*. Biofilm samples should be collected with swabs from the inside of some sections of these pipes. It is sometimes

possible to do this by removing a jet but quite often sections of pipe will have to be cut out to gain adequate access.

Air washers and humidifiers

Collect samples of at least 200 mL directly from the source.

Decorative fountains, water features and irrigation systems

Collect samples of at least one litre, if possible from the warmest part of the system.

Sample transport and laboratory processing

Samples must be kept at ambient temperature and protected from direct light. Water and swabs should be processed on the day of collection or within 24 hours of collection when stored at a refrigerator temperature (ISO 11731). Do not freeze samples.

During the sampling, all details that may help the implementation of possible remedial measures should be recorded. For example, obvious pressure and temperature drops or rises in the water circuits, the presence of iron sediment or sludge, the condition of aerator and taps, the occurrence of scale, and the presence of various rubber and plastic attachments. The presence of biocide (time and date dosed) and type of biocide and other control factors dependent on the system e.g. pH levels, appearance of the water etc. should be recorded.

WARNING: It is important to follow the sampling procedure. Incorrectly collected samples make interpretation of the results difficult.

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